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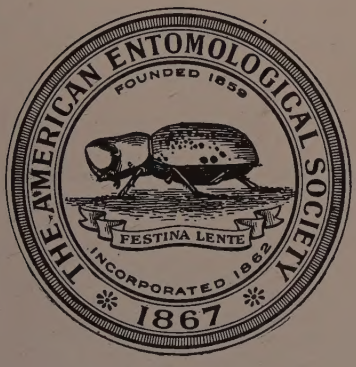

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A SYSTEMATIC ANNOTATED ARRANGEMENT OF THE GENERA AND SPECIES OF THE INDO-AUSTRALIAN EPHYDRIDAE (DIPTERA)

II. THE SUBFAMILY NOTIPHILINAE AND SUPPLEMENT TO PART I ON THE SUBFAMILY PSILOPINAE

BY EZRA T. CRESSON, JR.

Research Fellow, Department of Insects, The Academy of Natural Sciences of Philadelphia

This is the second part of my series of papers dealing with the Indo-australian Ephydridae. The first part [1] considered the subfamily Psilopinae, and that part should be consulted for the introduction to this series of papers. Also included here is a supplement to the first part, being corrections and additions found since its publication.

In addition to the acknowledgments made for material studied as noted in the first part, I wish to add: Mario Bezzi, Torino, (deceased) [Bezzi]. B. P. Bishop Museum [Bishop]. Hydrobiologische Anstalt der Kaiser-Wilhelm Gesellschaft [HA]. Musee National Hungrois [MNH].

Subfamily NOTIPHILINAE

1929. Notiphilinae Cresson, Trans. Amer. Ent. Soc., LV, p. 180.

The Notiphilinae, as known to me, are not a large group as regards the number of genera. As represented in the Indo-australian Region, we have: *Donaceus* and *Zeros* of the tribe

[1] These Transactions, LXXI, pp. 47–75, 1945.

Ilytheini, *Hydrellia* of the Hydrelliini, *Nostima* of the Hydrinini, *Paralimna* and *Notiphila* of the Notiphilini, and *Typopsilopa* of the Typopsilopini.

In this subfamily I am recognizing eight genera, one described as new, and thirty-one species, three of which are new. In addition are included thirty-seven species which were described from this region but which I could not recognize in the material of over 1,555 specimens studied.

Tribe Ilytheini

1943. Ilytheini Cresson, Trans. Amer. Ent. Soc., LXIX, p. 1.

This tribe contains three genera, *Ilythea* Haliday, *Zeros* Cresson, and *Donaceus* Cresson. *Ilythea* is not known to me from the Indoaustralian Region. It differs from the other two in having the second vein of the wings long, making the second costal section several times longer than the third.

DONACEUS

1943. *Donaceus* Cresson, Trans. Amer. Ent. Soc., LXIX, p. 5.

The species of this genus have two postsutural dorsocentrals and but one postsutural intra-alar.

Donaceus nigronotatus Cresson

1943. *Donaceus nigronotatus* Cresson, Trans. Amer. Ent. Soc., LXIX, p. 5, pl. 2, figs. 8 and 9. [Formosa.]

ZEROS

1943. *Zeros* Cresson, Trans. Amer. Ent. Soc., LXIX, p. 10.

Zeros deflectus (Malloch). *Ilythea deflecta* Malloch, Proc. Linn. Soc. N.S. Wales, L, p. 327, fig. 12 (of wing), 1925. [Australia.] *Zeros deflectus,* Cresson, Trans. Amer. Ent. Soc., LXIX, p. 15, 1943.

This species is unknown to me, but evidently belongs here, judging from the original description and the figure of the wing.

Tribe Hydrinini

1944. Hydrinini Cresson, Trans. Amer. Ent. Soc., LXX, p. 175.

NOSTIMA

1900. *Nostima* Coquillett, Can. Entom., XXXII, p. 35.
1917. *Philygriola* Hendel, Deuts. Ent. Zeits., 1917, p. 42.
1944. *Nostima,* Cresson, Trans. Amer. Ent. Soc., LXX, p. 176. Syn. of *Philygriola.*

Nostima duoseta Cresson

1943. *Nostima duoseta* Cresson, Notulae Nat., Phila., no. 121, p. 3. [New South Wales.]

Species Incertae

Philygriola monticola Malloch, Bull. B. P. Bishop Mus., no. 114, p. 15, figs. 6a and b, 1933. [Marquesas Islands.]

I do not know this species, but on characteristics gleaned from the original description and figures of the head and wings, the author seems to have placed it correctly. It has the wings spotted, similar to some species of the Ilytheini. He, however, does not give the relative position of the two notopleurals.

Parahyadina lacustris Tonnoir & Malloch, Rec. Canterb. Mus., III, p. 17. [New Zealand.]

This genus and species probably belong to the Hydrinini. The authors associated the genus with others I have included in this tribe, and were apparently correct.[2]

Tribe HYDRELLIINI

1944. Hydrelliini Cresson, Trans. Amer. Ent. Soc., LXX, p. 163.

HYDRELLIA

1830. *Hydrellia* Robineau-Desvoidy, Essai Myod., p. 790.

Hydrellia williamsi Cresson

1936. *Hydrellia williamsi* Cresson, Trans. Amer. Ent. Soc., LXII, p. 259. [Hawaii.]

AUSTRALIA: Adelaide, South Australia, (J. Davidson) [IIE, 8]. Botany Bay, New South Wales, (H. Peterson) [USNM, 29]. Beaumaris, Victoria, III 31; Sandringham, IV 4; (all T. D. A. Cockerell) [all USNM, 2]. NEW ZEALAND: Kumara, Westland, III 29, (J. W. C.); The Domain, Auckland, VII 15, (D. Stone) [all USNM, 4].

[2] They also included *Hyadina* Haliday in the association, but I do not consider that genus a member of the present subfamily, Notiphilinae.

Hydrellia tritici Coquillett

1903. *Hydrellia tritici* Coquillett, Entom. News, XIV, p. 324. [Australia.]
1925. *Hydrellia tritici,* Malloch, Proc. Linn. Soc. N.S. Wales, L, p. 327. [Australia.]
1926. *Hydrellia tritici,* Malloch, Rec. Canterb. Mus., III, p. 14. [New Zealand.]
1932. *Hydrellia tritici,* Cresson, Trans. Amer. Ent. Soc., LVIII, p. 15. [Australia.]

Hydrellia latipalpus Cresson

1943. *Hydrellia latipalpus* Cresson, Notulae Nat., Phila., no. 121, p. 4. [Ceylon.]

Hydrellia huttoni new species

1932. *Hydrellia enderbyi* Cresson (not *Drosophila enderbyi* Hutton, redescribed as *Hydrellia enderbyi* by Tonnoir and Malloch, 1926), Trans. Amer. Ent. Soc., LVIII, p. 8. [Australia.]

This misidentified form proves to be a new species, and differs from Tonnoir and Malloch's redescription in that there are no distinct antesutural dorsocentrals nor are there any microsetulae between the apical scutellars. A more detailed description will be found under *enderbyi* as of Cresson (1932).

Type.—Male; Victoria, Australia; 1888; [Academy of Natural Sciences of Philadelphia, no. 6676].

Paratype.—1 ♂, with same data as for type.

Hydrellia luteipes Cresson

1932. *Hydrellia luteipes* Cresson, Trans. Amer. Ent. Soc., LVIII, p. 13. [Formosa.]

Hydrellia victoria Cresson

1932. *Hydrellia victoria* Cresson, Trans. Amer. Ent. Soc., LVIII, p. 25. [Australia.] [3]

AUSTRALIA: Adelaide, South Australia, (J. Davidson) [IIE, 1]. Sydney, New South Wales, (L. Biro) [A.N.S.P., 1].

Mesonotum not cinereous anteriorly except somewhat on the humeri; legs dark.

Hydrellia unigena Cresson

1944. *Hydrellia unigena* Cresson, Notulae Nat., Phila., no. 135, p. 8. [Australia.]

[3] The type number of this species should be [A.N.S.P., no. 6615, not 6493].

Hydrellia hawaiiensis Cresson

1936. *Hydrellia hawaiiensis* Cresson, Trans. Amer. Ent. Soc., LXII, p. 263. [Hawaii.]

Species Incertae

Hydrellia ceramensis Meijere, Bijdr. Tot de Dierkund, XIX, p. 67, 1913. [Ceram.]

Hydrellia enderbyi (Hutton). *Drosophila enderbyi* Hutton, Trans. New Zeal. Inst., XXXIV, p. 174, 1901. [New Zealand.] *Hydrellia enderbyi,* Tonnoir and Malloch, Rec. Canterb. Mus., III, p. 15, 1926. Type redescribed.

See *H. huttoni* Cresson above cited.

Hydrellia velutiniformis Tonnoir and Malloch, Rec. Canterb. Mus., III, p. 15, 1901. [New Zealand.]

Probably allied to *Hydrellia williamsi* Cresson.

Key to the Indo-australian Species of the Genus Hydrellia

1. Facialia broadly niveous, which color extends onto the cheeks and postbuccal region; antenna III and tibiae, pale; tergite V of males long; genital segment long, not turned under. **hawaiiensis** Cresson

   Facialia, if niveous such color does not extend to postbuccal region; genital segment small, with greater part ventrad.....2

2. Supra-alar region and frontal orbits opaque velvety black; face niveous; fore legs except coxae, black; mid and hind femora yellow.....**tritici** Coquillett

   Supra-alar region not velvety black.....3

3. Frons excluding lunular margin, and antennae, velvety-black; face niveous; no antesutural dorsocentrals; legs for most part, yellow.....**williamsi** Cresson

   Frons velvety-black laterally only; antesutural dorsocentral present; legs dark.....**velutinifrons** Tonnoir and Malloch

   Neither frons nor antennae truly velvety-black.....4

4. Scutellum with a pair of microscopical hairs between the apicals; antesutural dorsocentral present; legs black.....**enderbyi** Hutton

   Scutellum without such hairs between the apicals.....5

5. Antesutural dorsocentral as strong as, and well separated from, the postsutural dorsocentral.....8

   Antesutural dorsocentral absent or minute; postsutural one near sutural margin.....6

6. Legs dark; facial series of three to four setae; arista with five to six hairs.....**huttoni** new species

Legs entirely yellow.....7

7. Arista with six hairs; facial series of three to four long setae. **luteipes** Cresson

Arista with nine hairs; facial series of eight micro-setae; palpi broad.....**latipalpis** Cresson

8. Mostly dark, rather shining species; tarsi dark; palpi yellow. **victoria** Cresson

Uniformly pollinose species; tibiae and tarsi, pale...**unigena** Cresson

Tribe NOTIPHILINI

1946. Notiphilini Cresson, Trans. Amer. Ent. Soc., LXXII, p. 228.

PARALIMNA

1862. *Paralimna* Loew, Monogr. Dipt. No. Amer., I, p. 138.

Subgenus **Paralimna**

1916. [*Paralimna*] (*Paralimna*) Cresson, Trans. Amer. Ent. Soc., XLII, p. 105.

Paralimna (Paralimna) sinensis (Schiner)

1862. *Notiphila sinensis* Schiner, K. Svenska Freg. Novara Resa., Zool., II, abt. 1, Dipt., p. 241. [Hong Kong, China.]
1914. *Paralimna sinensis,* Hendel, Suppl. Entom., III, p. 106. [Formosa.]
1929. *Paralimna sinensis,* Cresson, Trans. Amer. Ent. Soc., LV, p. 189. [Formosa.]

Since the publication of my 1929 records of this species, I have seen more material from various Formosa localities [DEI, 21] and also from Foochow, China, (M. S. Yang) [IIE, 5].

My 1929 record for this species from Kodiakand, South India, should be referred to *ornatifrons* Meijere; and probably those of Osten Sacken[4] and Hendel[5] from the Celebes may be for the same species or *concors* Cresson, or *punctata* Meijere.

This is a member of the species group having the bare, flattened, dorsal, niveous or ochraceous color spot on the second antennal segment. The face in the present species is dark, sometimes uniformly brownish, with one strong facial, and the dark areas on

[4] Ann. Mus. Civ. Nat. Genova, XVI, p. 492, 1881.
[5] Rec. Sci. Voy. Indes Neeland., IV, (7), p. 30, 1932.

the thorax and abdomen are extensive. The flexor ciliation on the fore femur of the males is not strongly developed distad.

Paralimna (Paralimna) ornatifrons Meijere

1914. *Paralimna ornatifrons* Meijere, Tijds. v. Entom., LVII, p. 246. [Java.]
1924. *Paralimna albonotata* Becker (not Loew, 1869), Suppl. Entom., XIII, p. 89. [Formosa.]
1929. *Paralimna ornatifrons,* Cresson, Trans. Amer. Ent. Soc., LV, p. 190. [India, Ceylon.]

This is apparently the southern form of *sinensis,* and probably is that referred to as *sinensis* by Osten Sacken and Hendel from the Celebes, and by my 1929 record from India and Ceylon. See my note under that species. No doubt the series of 119 specimens Becker (1924) determined as the African *albonotata* should apply to the present species. There seems to be no record that Becker was acquainted with the true *albonotata.*

The present species differs from *sinensis* in that the antennal spot is smaller and ochraceous rather than niveous and there is a white spot above the velvety-black fronto-orbital spot.

Paralimna (Paralimna) concors Cresson

1929. *Paralimna concors* Cresson, Trans. Amer. Ent. Soc., LV, p. 189. [Philippine Islands, Amboina.]

This species differs from *sinensis* in having the clypeus niveous contrasting with the more ochraceous facial color. There are three or more facials in definite series, and the anterio-flexor cilia of the fore femur of the males is stronger and of more noticeably flattened setae.

Paralimna (Paralimna) hirticornis Meijere

1913. *Paralimna hirticornis* Meijere, Bijdr. tot de Dierkund, XIX, p. 65.[6] [Saonek near Waigiu.]
1914. *Paralimna nitens* Bezzi, Phil. Jour. Sci., VIII, (D), p. 332.[6] [Philippine Islands.]
1914. *Paralimna hirticornis,* Hendel, Suppl. Entom., III, p. 104. [Formosa.]
1929. *Paralimna hirticornis,* Cresson, Trans. Amer. Ent. Soc., LV, p. 191. [Formosa, Philippine Islands.]

[6] This part of the Bijdragen was received at the Academy of Natural Sciences of Philadelphia January 6, 1914. Bezzi's paper was issued January 16, 1914, although bearing date of August, 1913.

BALUCHISTAN: Quetta, XI, (Nazeer) [IIE, 1]. INDIA: Coimbatore, Madras, XII 1 to 13, (Y. R. Coll.; on grass in damp places) [IIE, 10]. CEYLON: (W. Horn) [DEI, 2]. BURMA: Lashio, X, (L. N. Johri & B. S. Gogate) [IIE, 3]. FORMOSA: Chipum, VII; Kanshizei, IV; Pilam, VII; Tainan, II and X, (all H. Sauter) [all DEI, 194]. PHILIPPINE ISLANDS: Manila, XII; Puerto Princesa, Palawan, (R. C. McGregor) [USNM, 4].

Paralimna (Paralimna) punctata Meijere

1908. *Paralimna punctata* Meijere, Tijds. v. Entom., LI, p. 164. [Java.]
1929. *Paralimna cinerella* Cresson (not Hendel), Trans. Amer. Ent. Soc., LV, p. 189. [Ceylon, India, not Formosa.]

INDIA: Madras, "Guindy," (Cragg), [Vienna, 2]; "Sulur," Coimbatore District, XII 15, [IIE, 1]. CEYLON: Peradeniya, XI, (Dr. Uzel) [Vienna, 1]. BURMA: Minhi District, "Mezali, Purnsys," (E. Freebrade) [IIE, 2]. JAVA: Bali Island: Tjandikoesoema, IV 25–28, [Prince Leopold Belg. Nat. Hist. Mus., 1].

Paralimna (Paralimna) cinerella Hendel

1914. *Paralimna cinerella* Hendel, Suppl. Entom., III, p. 107. [Formosa.]
1924. *Paralimna arabica* Becker (not Becker 1922), Suppl. Entom., XIII, p. 90. [Formosa.]
1929. *Paralimna cinerella,* Cresson, Trans. Amer. Ent. Soc., LV, p. 189. [Formosa, not India and Ceylon.]

This is probably a form of *punctata* Meijere, and at present known only from Formosa. My 1929 record of this species from Ceylon and India should be for *punctata*. Becker's determination of the African *arabica* for a specimen from Formosa should no doubt apply to this species.

It is more cinereous than *punctata;* the dark anterior part of the frons and the black orbital spot are scarcely discernible. The dark bases of the tergites are absent or densely overcast with the vestiture.

Bezzi's description is not in agreement with my material nor with Meijere's description, but I believe the two to be the same.

A well distributed species with the niveous spot on the second antennal segment very conspicuous. It is more slender than the other species of this group, with the large velvety-black frontorbital spot.

Paralimna (Paralimna) javana van der Wulp

1891. *Paralimna javana* van der Wulp, Tijds. v. Entom. XXXIV, p. 215. [Java.]

1914. *Paralimna biseta* Hendel, Suppl. Entom., III, p. 105. [Formosa.]
1924. *Paralimna javana,* Meijere, Tijds. v. Entom., LXVII, p. 205. [Java.]
1929. *Paralimna javana,* Cresson, Trans. Amer. Ent. Soc., LV, p. 192. [Formosa, India, Australia.]

FORMOSA: Kanshizei, IV, (H. Sauter) [DEI, 136]. INDIA: Karnal, Bengal, XI 29, (F. J. Barraud; on mud) [IIE, 3].

Paralimna (Paralimna) picta Kertesz

1901. *Paralimna picta* Kertesz, Termez. Fuzet., XXIV, p. 423, pl. 20, figs. 12 and 13. [New Guinea.]
1929. *Paralimna picta,* Cresson, Trans. Amer. Ent. Soc., LV, p. 184. [Deslacs Island, Bismarck Archipelago, Philippine Islands.]

ADMIRALTY ISLANDS: Manus, V, (J. L. Froggatt) [IIE, 1]. PHILIPPINE ISLANDS: Puerto Princesa, Palawan, (R. C. McGregor) [USNM, 1].

Belongs to the *javana* group (with the posterior crossvein distinctly clouded). Face cinereous, with very little discoloration on the hump; second antennal segment, although cinereous dorsad, does not possess the flattened area.

Paralimna (Paralimna) millepuncta Malloch

1925. *Paralimna millepuncta* Malloch, Proc. Linn. Soc. N.S. Wales, L, p. 325. [Australia.]
1929. *Paralimna millepuncta,* Cresson, Trans. Amer. Ent. Soc., LV, p. 185. [Australia.]

Similar to *javana* but the frontorbitals are weak, not as strong as the postocellars; the face is cinereous to ochraceous, not niveous, and the abdominal fasciae are well defined.

Paralimna (Paralimna) major Meijere

1911. *Paralimna major* Meijere, Tijds. v. Entom., LIV, p. 393. [Java.]

FORMOSA: Tainan, II, (H. Sauter) [DEI, 41]. SIAM: East Point, XI 27, XII 7, (W. R. S. Ladell) [IIE, 2].

This large species is almost uniformly olive brown to olive green, without definite darker or lighter markings; with two strong frontorbitals, four to six facials, and well-separated erect setae or spines on the second costal section. The fore femur, on its distal half, has three to four very long, widely separated postflexor setae.

Subgenus **Phaiosterna**

1911. [*Paralimna*] *Phaiosterna* Cresson, Trans. Amer. Ent. Soc., XLII, p. 104.

Paralimna (Phaiosterna) aequalis Cresson

1929. *Phaiosterna aequalis* Cresson, Trans. Amer. Ent. Soc., LV, p. 193. [French Indo China.]

INDIA: Tondiarpet, Madras, VIII 13, (T. B. Fletcher; open sewer) [IIE, 3]. FORMOSA: Tainan, V, X; Polisha, XII; (all H. Sauter) [MNH, 8; DEI, 3]. PHILIPPINE ISLANDS: Los Banos, (C. F. Baker); Mt. Makiling, Luzon, [Baker, 3]; Manila, VII 7, (R. C. McGregor) [USNM, 7]. AUSTRALIA: "N. Holland," [ANSP, 1].

Species Incertae

Paralimna lineata Meijere, Tijds. v. Entom., LI, p. 165, 1908. [Samarang, Java.] Lamb, Trans. Linn. Soc. London, Zool., XV, p. 311, 1912. [Seychelles Islands.] Frey, Oefvers Finska Vet. Soc. Forh., LIX, A, no. 20, p. 29, 1917. [Ceylon.] Bezzi, Dipt. Fiji Isl., p. 154, 1928. [Lautoka.] Aubertin, Entomologist, LXII, p. 174, 1929. [Oceania.] Malloch, Bull. B. P. Bishop Mus., no. 114, p. 11, 1933. [Marquesas Islands.] Malloch, Ins. Samoa, VI, p. 313, 1934. [Samoa.]

Paralimna insignis Meijere, Tijds. v. Entom., LIV, p. 392. [Wonosobo, Java.]

Probably allied to *sinensis*.

Paralimna minor Hendel, Suppl. Entom., III, p. 108, 1914. [Tainan, Formosa.]

Possibly a small form of *cinerella* Hendel.

Paralimna atrimana Malloch, Proc. Linn. Soc. N.S. Wales, L, p. 326, 1925. [Beharing and Narandera and Sydney, New South Wales; Eidsvoid Queens, Australia.]

Said to be similar to *millepuncta* by the author.

Paralimna stirlingi Malloch, Proc. Linn. Soc. N.S. Wales, LI, p. 545, 1926. [Alexandria, North Australia.]

Possibly allied to *millepuncta* Malloch.

Paralimna uniseta Malloch, Proc. Linn. Soc. N.S. Wales, L, p. 325, 1925. [Fish River, New South Wales.]

I cannot recognize this species among my material, but it probably belongs to the *javana* group, as no mention is made by the author of an antennal spot.

Key to the Indoaustralian Species of Paralimna

1. Antenna II with a bare flattened dorsal area cephalad of the strong erect dorsal seta, this area usually niveous.....6
   Antenna II normal, without such flattened area.....2
2. Crossveins distinctly clouded; face cinereous, with little discoloration, in profile with weak median hump; antenna II cinereous on dorsum.....**picta** Kertesz
   Crossveins not clouded.....3
3. Small species (2 to 2.5 mm. long) without any cinereous vestiture except that some may be present on the femora; abdominal fasciae and ventral surfaces may be olivaceous.
   (Phaiosterna) aequalis Cresson
   Larger species, generally with some cinereous vestiture.....4
4. Two subequal, well separated and sometimes a third smaller, facials present; frontorbitals almost as strong as the ocellars; irrorations weak or absent; brown fasciae of tergites obscure or absent. Small species.....**javana** van der Wulp
   Three or more closely set facials present.....5
5. Frontorbitals not as strong as postocellars; small species with cinereous face and distinct brown abdominal fasciae.
   millepuncta Malloch
   Frontorbitals as strong as ocellars; large species almost totally brown to ochraceous. The brown areas and irrorations weakly developed; costa with distinct erect setae.....**major** Meijere
6. Lateral areas of mesonotum and anterior margin of frons more or less shining black; niveous antennal spot and velvety black frontal spot conspicuous.....**hirticornis** Meijere
   No conspicuous shining areas on mesonotum.....7
7. Brown markings of mesonotum and abdomen recessive, on the former scarcely brown vittate, on the latter rarely forming median vitta.....8
   Brown pattern well developed, distinctly vittate or coalescing into large areas on mesonotum, and forming a distinct median vitta on abdomen.....9
8. Frontorbital velvety-black spot large and conspicuous; face brownish.....**punctata** Meijere
   No frontorbital black spot, or it is very small; face cinereous.
   cinerella Hendel
9. Facialia with few (one or two) facials and few setae; fore femur of males with slight flexor sulcus; antero-flexor series of short, not strongly flattened setae.....10
   Facialia with numerous setae and three or more strong facials; fore femur of males with distinct flexor sulcus and antero-flexor series of long flattened setae.....**concors** Cresson

10. Flattened dorsal area on antenna II large, niveous, conspicuous; no niveous spot at lateral cephalic angles of frons.
sinensis (Schiner)

Flattened antennal area small, ochraceous, inconspicuous; usually a conspicuous niveous spot at lateral cephalic angles of frons.
ornatifrons Meijere

NOTIPHILA

1813. *Notiphila* Fallen, K. Svenska Vet.-Akad. Handl., 1913, p. 248.

Notiphila, as can be said of *Ephydra,* was the recipient of many species not belonging therein, and some which are not even members of the Ephydridae. Furthermore, many of the older species were so superficially described as to render them unrecognizable.

A difficult genus, the accepted species of which can be distinguished only after studying large series from many localities. The male genitalia may offer characters that will be of great aid in this matter, but I have not made a study of these organs. Among my material of over 780 individuals from this region, I have been able to recognize but a few of the species described. The one here described as new, may prove to be a form of one of the already described species. Because of the difficulty in identifying many of the species, I have made no attempt to give a key for their separation.

The species of this genus are superficially not unlike those of *Hydrellia.* They are easily distinguished by the strong ocellars, humeral and supra-alar; the erect extensors on the mid tibiae, and the ending of the costa at or slightly beyond the third vein, never attaining the fourth.

Subgenus **Agrolimna**

1916. [*Notiphila*] *Agrolimna* Cresson, Trans. Amer. Ent. Soc., XLIII, p. 48.

The species of this subgenus have the facials relatively hair like, in series extending well above mid-facial profile; the preapical erect extensor of the mid tibia is present, there being four such extensors. I have recognized but one species belonging to this group from the present fauna.

Notiphila (Agrolimna) punctum Meijere

1911. *Notiphila punctum* Meijere, Tijds. v. Ent., LIV, p. 391. [Java.]
1914. *Notiphila maculifrons* Hendel, Suppl. Entom., III, p. 102. [Formosa.]
1914. *Notiphila punctum,* Meijere, Tijds. v. Ent., LVIII, p. 248. Synonymizing *N. maculifrons* Hendel.
1938. *Notiphila maculifrons* Hendel, Arch. f. Zool., Berlin, XXX, A, (3), p. 12. [China.]

JAVA: Megamendg Mountains, (Bryant and Palmer) [USNM, 1.] FORMOSA: Takao, III 31, VI 13, (H. Sauter) [MNH, 2]. PHILIPPINE ISLANDS: Los Banos, Mt. Makiling, [Bezzi, 1].

This species is recognized by the velvety-black frontal spot.

I agree with Meijere in the synonymy of *maculifrons.*

Subgenus **Notiphila**

1917. [*Notiphila*] *Notiphila* Cresson, Trans. Amer. Ent. Soc., XLIII, p. 31.

The species of this subgenus have the facials stronger than in *Agrolimna,* limited to three to four in the series which does not, or scarcely, attains the mid facial profile, and there are only three noticeable extensors on the mid tibiae, the apical one being absent or minute.

Notiphila (Notiphila) latigenis Hendel

1914. *Notiphila latigenis* Hendel, Suppl. Entom., III, p. 102. [Anping, Formosa.]

A species recognized by its broad cheeks, which are almost equal to one-half the eye-height. The abdominal maculation is recessive, obscured, only the median pair of elongate brown spots on tergites three and four are present, or the lateral ones merely suggestive.

FORMOSA: Tainan, III, (H. Sauter) [ANSP, 2].

Similis Group

This group contains several species which have comparatively narrow cheeks; pale antennae, palpi, tibiae and tarsi; the macrochaetae usually with dark dots at their bases. They are difficult to differentiate, and as here recognized, contain *similis* Meijere, *phaea* Hendel, *fuscimana* Malloch, and probably *sternalis* Thomson.

Notiphila (Notiphila) similis Meijere

1908. *Notiphila similis* Meijere, Tijds. v. Entom., LI, p. 162. [Java.]
1912. *Notiphila phaea* Cresson (not Hendel), Arch. f. Hydrobiol., Suppl., IX, Trop. Binen, II, p. 585. [Sumatra.]

FRENCH INDO CHINA: Middle Annam, (H. Frustorfer) [ANSP, 1].

I recognize this species on a few individuals from Sumatra and French Indo China. They have the mesonotum faintly vittate with brown, leaving a narrow median stripe usually lighter in color and without setulae; the mesopleura has a brown spot; arista with twelve to thirteen hairs; face light yellow, with the two upper facials about as near each other as their distance above the epistoma. The dark abdominal spots are distinct and may coalesce into fasciae; fifth tergite with a large dark spot, somewhat shining; second costal section more than twice as long as the third.

FORMOSA: Anping, Kanshizei, Koshum, Tainan, Takao, (all H. Sauter) [all ANSP, 30]. CHINA: Foochow, (M. S. Young) [IIE, 2].

This series agree with an individual from Tainan, Formosa, determined by Dr. Hendel as *similis* Meijere. However, I think Hendel was incorrect.

The present form differs from *similis* as above recognized, by the lighter gray vestiture, which is less overcast with brownish. The face is whitish, seldom yellowish; the upper facials are separated by more than, or as much as, their distance above the epistoma; the mesonotum is not even faintly vittate. The abdominal spots rather opaque, small, definitely isolated, not contiguous at their bases, irrorations indistinct; tergite V entirely cinereous, or at most with a small spot. Head distinctly transverse (width to height as 95:70). Frons quadrate. Face broad, about .5 width of head and as broad as long; facials much further apart than their distance above epistoma. Arista with about ten hairs. Mesonotal setulae not seriated medianly. Costa II of wings nearly twice as long as III; ultimate section of vein IV nearly as long as penultimate. Length, 3 to 4 mm.

Notiphila (Notiphila) philippinensis new species

This may be a variety of *sternalis* Thomson [7] from Manila, but that species was described as having the abdomen immaculate. It may also be the *sternalis* Thomson recorded from the Philippine Islands by Bezzi [8] who, however, merely made the citation without any notes.

[7] K. Svenska Freg. Eugenies Resa, Zool., I, p. 593, 1868.
[8] Phil. Jour. Sci., (D), VIII, p. 331, 1913.

Pale, yellow to orange are the: antennae, palpi, apices of femora, all tibiae and tarsi, and halteres. Wings immaculate, with pale veins.

Vestiture in general, olivaceous; frons more ochraceous; face and cheeks yellowish; mesonotum slightly overcast with brownish; the brown mesopleural spot round or longitudinal; abdomen with four slightly shining, round or quadrate, brownish spots on tergites III and IV, which may coalesce to form medianly interrupted fasciae; tergite V of males is more shining with apical margin and median stripe gray.

Head slightly broader than high; frons slightly transverse; eyes ovate with axis vertical. Face about .3 width of head, almost twice as long as broad, its narrowness accentuating the sharpness of the carina; the distance between the upper pair of the two or three stout facials about equals their distance above the epistomal margin. Cheeks scarcely broader than the width of antenna III; arista with about twelve hairs. Mesonotal setulae minute, irregular except two very close median series, between which series the surface is bare and the vestiture is slightly paler; macrochaetae with indistinct blackish spots at their bases; mid tibia with three extensors, and that of the males with flexor ciliation on the distal half; basal fascicle of hind tarsi is black. Costal section II more than twice as long as III; penultimate section of vein IV about as long as the ultimate; posterior crossvein slightly more than .5 length of ultimate section of vein IV. Length, 3.25 mm.

Type.—Male; Los Banos, Philippine Island, (C. F. Baker) [Academy of Natural Sciences of Philadelphia, no. 6677].

Paratypes.—1 ♂, topotypical; 1 ♀, Mt. Makiling, Luzon, Philippine Islands, (C. F. Baker).

Notiphila (Notiphila) phaea Hendel

1914. *Notiphila phaea* Hendel, Suppl. Entom., III, p. 101. [Formosa.]

FORMOSA: Chip Chip, II; Kanshixu, IV; Takoa, IV; Tainan, II: (all H. Sauter) [all ANSP, 38].

Similar to *similis* Meijere as here recognized, but seems to be constant in the following respects:

Abdominal spots more shining, particularly the lateral ones in the females, and almost the entire tergite V in both sexes. The mesonotal setulae show no median serial arrangement; frons usually more transverse; the upper facials are more removed from each other; the median abdominal spots are usually narrow and elongate rather than quadrate, often quite indistinct in the males; irrorations generally quite distinct. Ultimate section of vein IV usually shorter.

Notiphila (Notiphila) fuscimana Malloch

1923. *Notiphila fuscimana* Malloch, Proc. Linn. Soc. N.S. Wales, XLVIII, p. 326. [New South Wales.]

AUSTRALIA: Parramata, New South Wales, 1900, (L. Biro) [ANSP, 2].

These individuals agree well with Malloch's description, particularly in having the fore tibia and tarsi somewhat infuscated, thus differing from the other species of this group known to me.

The head is distinctly broader than high, thus broadening the frons and face; also the cheeks are broad, almost equallying the length of antenna III. The mesonotum shows no faint vittation; the abdominal markings are large, obscured, the spots separated or coalescing; tergite V entirely opaque or with two small faint spots. Costa II is almost three times as long as III.

Before me are also six individuals (2 ♂, 4 ♀) from Brisbane, Queensland, (L. Biro) [ANSP], which differ from those from Parramata in having the head, frons and face, narrower, the frons being quite quadrate; the median abdominal spots more marked, the median more distinctly separated from the lateral ones.

Subgenus **Notiphilacantha**

1914. *Notiphilacantha* Hendel, Suppl. Entom., III, p. 103.

Notiphilacantha was erected for *Notiphila dorsopunctata* Wiedemann, based on the presence of long erect setae on the costa. Only the two following species, known to me, have this character. However, in addition to this variable character, these species possess another feature, which although it is not structural, seems to be constant. That is the uniformly cinereous mesonotum marked with large round blackish spots at the bases of the macrochaetae. Although some evidently close relatives, retained in *Notiphila* sens strict., have these mesonotal marks, they are small or inconspicuous.

Because of the variability of the costal setation, but the constancy of the mesonotal maculation, I have reduced the genus to subgeneric rank.

Notiphila (Notiphilacantha) dorsopunctata Wiedemann

1824. *Notiphila dorsopunctata* Wiedemann, Anal. Entom., p. 58. ["India orient."]

1830. *Notiphila dorsopunctata* Wiedemann, Aussereur. Zweifl. Ins., II, p. 591.

1891. *Notiphila dorsopunctata,* Van der Wulp, Tijds. v. Entom., XXXIV, p. 215. [Java.]

1908. *Notiphila dorsopunctata,* Meijere, Tijds. v. Entom., LI, p. 163. [Java.]

1914. *Notiphilacantha dorsopunctata,* Hendel, Suppl. Entom., III, p. 103. [Formosa.]

1931. *Notiphilacantha dorsopunctata,* Cresson, Arch. f. Hydrob., Suppl., IX, p. 585. [Sumatra.]

FORMOSA: Chip Chip, IV; Kanshizei, IV; Tainan, II, (all H. Sauter) [all DEI, 710]. SUMATRA: (A. Thienemann) [HA, 4]. SIAM: Bangkok, IX 1, (W. R. S. Ladell); Klong Rang Sit, IX 15, (W. R. S. Ladell); Petchaburi, XII 20, (T. D. A. Cockerell) [all IIE, 4]. CHINA: Taichow, X 5, (T. G. Chen) [IIE, 2]. INDIA: Coimbatore, X 12, (B. R. P.; from paddy roots); XII 15, ("Y. R."); Pusa Botanical Area, XII 28, (Ramsaran; on tobacco) [all IIE, 5]. CEYLON: Bentotte [ANS, 1].

This species is recognized by the general cinereous color of its vestiture, variegated by the large black or brownish black spots at the bases of the strong mesonotal and scutellar macrochaetae. All macrochaetae are strong. The abdominal brown markings are generally overcast with gray; the median marks are narrow and almost attain the apices of the tergites. The costa has about fourteen short, stout, setae or spinules on the first section, between the humeral crossvein and the tip of the first vein; these spinules are not as long as, or scarcely longer than, the thickness of the costa, and sometimes may not be distinguishable from the normal appressed ciliation; third costal section has erect widely separated setae, which also may be difficult to distinguish.[9] Penultimate section of fourth vein is to the ultimate as 16:12.

One female from Coimbatore, South India, "8.II.13," (P. S. Coll.) [IIE], differs from the more typical in that the brown abdominal spots are more distinct, and the median pair are quadrate and those on the third tergite connect with the laterals forming a medianly interrupted fascia. The costa shows no erect setae.

Notiphila (Notiphilacantha) spinosa new species

This species is easily recognized by the ochraceous yellow color of the vestiture, the decidedly yellow face and the much longer spinose cilia on the costa, particularly the eight or more setae on the first section, which are much longer than the thickness of the costa. The median brown marks on the tergites are somewhat longer than is general in *dorsopunctata,* and form almost complete interrupted vittae; the ultimate section of the fourth vein is shorter (penultimate to ultimate as 22:15). Length, 5 mm.

Type.—Male; Los Banos, Philippine Islands; (C. F. Baker) [Collection of M. Bezzi].[10]

Paratypes.—1 ♀, Island of Basilan, Sulu Archipelago; 2 ♀, Mt. Makiling, Luzon; all Philippine Islands; (all C. F. Baker).

[9] These spinules and setae are best seen when viewed directly down in the same plane as that of the wing.

[10] The male type and two of the paratypes were returned to Dr. Bezzi January 14, 1924. Whether or not his collection has escaped destruction I do not know. One of the Mt. Makiling paratypes is in the collection of this Academy.

In some respects this species suggests *Notiphila ciliata* Van der Wulp.[11]

Species Incertae

Notiphila albiventris Wiedemann, Anal. Entom., p. 58, 1824. ["India orient."] Wiedemann, Aussereur. Zweifl. Ins., II, p. 589, 1830. Meijere, 1908, Tijds. v. Entom., LI, p. 164.

Probably a member of *Paralimna*.

Notiphila carbonaria Walker, Proc. Linn. Soc. London, Zool., VIII, p. 129, 1865. [New Guinea.] Meijere, Tijds. v. Entom., LI, p. 163, 1908.

The black halteres are a feature unknown to me in *Notiphila*.

Notiphila ciliata Van der Wulp, Veth's Mid. Sumatra, IV, Apt. 9, p. 55, 1891. [Sumatra.] Meijere, Tijds. v. Entom., LI, p. 164, 1908. [*Notiphilacantha*] *ciliata* Hendel, Suppl. Entom., III, p. 103, 1914.

Meijere (1908) states that this species differs from *Notiphila dorsopunctata* Wiedemann in its yellow antennae, but the original description states "antennis fuscis." It is probably a member of the subgenus *Notiphilacantha* as placed by Hendel, 1914.

Notiphila fasciata Wiedemann, Anal. Entom., p. 57, 1824. ["India orient."] Wiedemann, Aussereur. Zweifl. Ins., II, p. 589, 1830. Meijere, Tijds. v. Entom., LI, p. 164, 1908.

Probably another member of *Paralimna*.

Notiphila flavilinea Walker, Proc. Linn. Soc. London, Zool., IV, p. 171, 1856. [Celebes.] Meijere, Tijds. v. Entom., LI, p. 164, 1908.

I cannot recognize the species as belonging to this family.

Notiphila granifera Thomson, K. Svenska Freg. Eugenies Resa, Zool., I, p. 594, 1868. [Ross Island, Burma.] Meijere, Tijds. v. Entom., LI, p. 164, 1908.

Probably a member of *Hecamede;* at least it is a member of the Psilopinae.

Notiphila immaculata Wiedemann, Aussereur. Zweifl. Ins., II, p. 592, 1830. [China.]

This was described as a shining green species. No such species of *Notiphila* is known to me.

[11] See that species under Species incertae following.

Notiphila impunctata Meijere, Tijds. v. Entom., LI, p. 163, 1908. [Java.]

This species may belong to the subgenus *Notiphilacantha*.

Notiphila indica Wiedemann, Anal. Entom., p. 58, 1824. ["India orient."]

No oriental *Notiphila* is known to me with maculate wings and shining thorax.

Notiphila insularis Grimshaw, Fauna Hawaii, III, p. 49, 1901. [Hawaii.]

This species is probably correctly assigned.

Notiphila lineosa Walker, Proc. Linn. Soc. London, Zool., IV, p. 170, 1860. [Celebes.]

Unrecognizable from Walker's description.

Notiphila ortalidoides Walker, Proc. Linn. Soc. London, Zool., VII, p. 222, 1865. [Mysol.]

The wings are described as being infuscated, with clear spots.

Notiphila peregrina Wiedemann, Aussereur. Zweifl. Ins., II, p. 592, 1830. [China.]

Probably not a *Notiphila*.

Notiphila quadrifascia Walker, Proc. Linn. Soc. London, Zool., IV, p. 70, 1860. [Celebes.]

Probably does not belong to *Notiphila*.

Notiphila radiatula Thomson, K. Svenska Freg. Eugenies Resa, Zool., I, p. 595, 1869. [China.]

A shining metallic green species. Not a *Notiphila*.

Notiphila setigera Becker (not of 1903), Suppl. Entom., XIII, p. 89, 1924. [Formosa.]

The two specimens thus determined from Formosa are probably *similis* Meijere, or one of the species of that group. *Notiphila setigera* was described from Cairo, Egypt, and is of the Palaearctic Zone.

Notiphila sternalis Thomson, K. Svenska Freg. Eugenies Resa, Zool., I, p. 593, 1869. [Manila.] Bezzi, Phil. Jour. Sci., (D), VIII, p. 331, 1913. [Philippine Islands.]

See my note on this species under *similis* Meijere.

Notiphila unicolor Walker, Proc. Linn. Soc. London, Zool., IV, p. 169, 1860. [Mysol.]

Unrecognizable as a *Notiphila*. Probably not an ephydrid.

Notiphila unilineata Walker, Proc. Linn. Soc. London, Zool., VIII, p. 129, 1865. [New Guinea.]

Unrecognizable.

Tribe TYPOPSILOPINI

1946. Typopsilopini Cresson, Trans. Amer. Ent. Soc., LXXII, p. 239.

TYPOPSILOPA

1916. *Typopsilopa* Cresson, Entom. News, XXVII, p. 147.

Typopsilopa chinensis (Wiedemann)

1830. *Notiphila chinensis* Wiedemann, Aussereur. Zweifl. Ins., II, p. 592. [China.]

1929. *Typopsilopa chinensis,* Cresson, Trans. Amer. Ent. Soc., LV, p. 194.

FORMOSA: Hokuto, XII; Tainan, V; Takao, XI, 8; (all H. Sauter) [MNH, 1; DEI, 31.]

Eleleides chloris new genus and species

Like all members of the Typopsilopini, this species has the general appearance of those in the tribe Psilopini of the subfamily Psilopinae. It differs from the more typical *Typopsilopa* in its deeply emarginated face, which is niveous, as is also the pleura. Additional generic features will be found in the following description of the genotype.

Basal two segments of fore, all except apical segments of mid and hind, tarsi, pale, yellow; halteres white; wings clear with black veins. Frons shining, but cinereous cephalad; face and cheeks niveous; mesonotum, scutellum shining, metallic green; notopleura, pleura, and tibiae cinereous to niveous.

Head in profile higher than long, broader than high with the antennae at about center line of the head and eyes. Frons convex in profile; vertex sharp; eyes large occupying about .75 of the head, bare, the facets but slightly larger cephalad; ocelli arranged in transverse triangle; postocellar (post-vertical?) divergent, caudad of line of posterior ocelli; ocellars strong, parallel, aligned with the anterior ocellus, slightly farther apart than the posterior ocelli; reclinate frontals strong, slightly lateroclinate, well in advance of line of ocellars; two proclinate frontorbitals, the anterior one strong, very near the reclinate frontals; no lumule; mesofrons extending to anterior margin; frontalia short. Face about .3 width of head with orbits

strongly flaring; in profile almost vertically straight with but slight convexity, the facial areas not well developed; the two long cruciate facials situated very low, slightly above line of epistoma, with one to two finer setae below in series extending onto the cheeks; the latter about as broad as antenna III; postbucca not extensive, rounding into the occiput; mouth, in width about .5 that of the head; oral margin strongly concave at epistoma with small, extruding, clypeus; proboscis normal; palpi normal. Antenna II sessile with dorsal seta, but very weak apical spine; III discoidal; arista with five hairs.

Mesonotum convex; setulae well separated and somewhat seriated; macrochaetae well developed: one pair of acrostichals just caudad of sutural region, dorsocentrals arranged I: I, prescutellars well removed from scutellum base and aligned with intra-alars; humeral, supra-alar and postalar, present; notopleura with two setae in horizontal alignment. Pleura with two strong mesopleural setae and one sternopleural. Scutellum convex, very sparsely setulose on dorsum, with four bristles, the lateral ones almost at extreme basal angles.

Abdomen without particularly long setae at apices of tergites; tergite V of males acute apicad; genital segment just visible and genitalia not conspicuous. (The sexes difficult to separate.)

Legs normal; mid tibia without erect extensors. Wings long with costa extending to vein IV and with humeral break, and cleft at tip of vein I; vein II short so that costal section II is but slightly longer than III; veins III and IV parallel; posterior crossvein perpendicular to vein III; alula broad auriculate.

All tarsi yellow except the distal two or three segments; halteres almost white; wings immaculate, yellowish with pale veins. Shining with slight metallic green reflection except on frons anteriorly; pleura cinereous. Face except dorsad, cheeks and anterior surfaces of tibiae, all niveous. Length, 3 mm.

Type.—Male; Victoria, Australia; 1888; [Academy of Natural Sciences of Philadelphia, no. 6678].

Paratypes.—3 ♂; 2 ♀; with same data as of type.

Key to the Indo-australian Genera of the Subfamily Notiphilinae

1. Ocellars stronger than the postocellars, the latter rarely as strong, often minute or wanting; eyes bare; lunule undeveloped; posterior notopleural seta weaker than the anterior one.....5
   Ocellars weaker than the postocellars, the former rarely strong; eyes generally pilose.....2
2. Posterior notopleural seta in normal position, near the notopleural suture, aligned with the anterior one.
   Hydrellia Robineau-Desviody
   Posterior notopleural seta removed dorsally from the suture.....3

3. Face swollen, with nose-like profile; wings rather uniformly spotted (Ilytheini).....4
   Face not swollen, not nasute in profile.....**Nostima** Coquillett
4. Vein II long; costal section II several times longer than III; two posutural dorsocentrals present.....**Donaceus** Cresson
   Vein II short; costal section II at most but slightly longer than III; only one postsutural dorsocentral present.....**Zeros** Cresson
5. Mid tibia with two to three erect or suberect extensor setae; more or less opaque species.....7
   Mid tibia without erect extensor setae; facials strong and cruciate; mostly shining, *Psilopa*-like species.....6
6. Face deeply emarginate at epistoma; shining greenish species. **Eleleides** new genus
   Face not deeply emarginate at epistoma; shining black species. **Typopsilopa** Cresson
7. Costa not extending beyond vein III; antennal spine strong; ocellars approximate, diverging.....**Notiphila** Fallen
   Costa extending to vein IV; antennal spine weak or absent; ocellars widely separated.....8
8. Small (2–2.5 mm.) entirely opaque, mostly cinereous species, but often golden on dorsal surfaces and the face; almost destitute of mesonotal setulae, but usually with well-developed macrochaetae; no sternopleural seta.....**Oedenops** Becker
   Larger, darker species with well-developed mesonotal setulae and sternopleural seta.....**Paralimna** Loew

Supplement to part I of this series, on the Indo-australian Psilopinae [12]

The following are additions and corrections which have since come to my attention. These include some errors, typographical and others which I consider of sufficient importance to correct. Also the receipt of additional material has added records, a few new species, cleared some synonymy and otherwise increased our knowledge of the species. The page numbers given within parentheses ( ) refer to pages of the part above mentioned.

Parathyroglossa ascabra (Page 50.)

Should be *Parathyroglossa scabra* (Cresson).

Chaetomosillus nigriceps Malloch, Occ. Pap., B. P. Bishop Mus., x, no. 17, p. 1, 1934. [New Guinea.] (Page 53, addition.)

This species was accidently omitted. It is unknown to me.

[12] These Transactions, LXXI, pp. 47–75, 1945.

Gymnopa subsultans (Fabricius), Becker, Entom. Mitt., XIII, p. 92, 1924. [Formosa.] (Page 54.)

I have no record of this European species from the Indoaustralian Region. It may be *Gymnopa grandis* Cresson [13] described from Formosa.

Placopsidella (Page 54.)

The synonym *Encastes* should be *Enchastes,* and the same correction should be made on page 55 under *Placopsidella cynocephala.*

Nomba tecta Walker, Proc. Linn. Soc. London, Zool., IV, p. 169, 1860. [Celebes.] (Page 55, addition to bottom of page.)

The genus and species is unrecognizable.

Hecamede persimilis Hendel (Page 56.)

1915. *Hecamede nivea* Meijere, Tijds. v. Entom., LVIII, Suppl., p. 61. [Simalu Island.]

1930. *Hecamede femoralis* Malloch, Rec. Canterb. Mus., III, p. 245. [New Zealand.]

I do not doubt the above synonymy of this well distributed Indoaustralian species.

Hecamede inermis Malloch, Bull. B. Bishop Mus., no. 114, p. 12, fig. 3, 1933. [Marquesas Islands.]

I do not know this species. It was described as lacking the "armature" on the apical half of the antero-ventral surface of the fore femur. Thus it would differ from *persimilis.* In all material I have seen of this genus from the Pacific islands, including Formosa, the fore femora possess an antero-ventral cilia of setulae, varying in length; one specimen from Formosa seems to lack this feature, but that individual is not in perfect condition.

Tribe ATISSINI

(Pages 56 and 73)

In studying additional material of this tribe I found species which do not possess all the features which have been considered essential characters of the tribe. Particularly is this the case with the relative positions of the anterior and posterior notopleurals. In

[13] Trans. Amer. Ent. Soc., LI, p. 232, 1925.

most of the species the posterior one is noticeably removed dorsad from the horizontal alignment with the anterior one; but in several species this removal is not marked or may not be noticeable. This variable character, fortunately, is accompanied by three others which must be considered in assigning species to this tribe. These are the presence of well-developed macrochaetae, the characteristic curving of the aristal hairs, which in a few species are absent (in the genus *Glenanthe*) or short, and the pointed broad wings. At least three of these four characters are present in all the species of this tribe. Consequently the first section of couplet 2 on page 73 must be amended to read:

Posterior notopleural generally well removed dorsad from the notopleural suture; aristal hairs, when present (absent only in *Glenanthe*) curved cephalad, not straight from the arista; wings broad, distinctly pointed at vein II. Mostly opaque pruinose species (Tribe Atissini).....14

Atissa antennalis Aldrich (Page 57.)

Since the publication of my paper I have been able to examine the type of this species.[14] It proves to be an aberrant member of the genus, particularly as regards the relative positions of the notopleurals, the posterior one being at most but slightly removed dorsad from horizontal alignment with the anterior one. Other features which may be added to the original description are as follows:

Eyes pilose; ocellars slightly caudad of the line of anterior ocellus; frontals in advance of ocellars. Face flat or slightly concaved, not carinated; upper pair of facials, which are dorso-mesally inclined, are situated slightly more approximate than the two lower pairs, and which are ventro-mesally inclined; between these and situated laterad is another seta dorsally inclined. Cheeks about as broad as width of antenna III. Mesonotal setulae small, in six to eight series; no supra-alar. Posterior notopleural situated slightly dorsad of the horizontal alignment of the anterior one. Scutellar apicals strongly cruciate. Abdomen very sparsely setulose. Wings broad, pointed at vein II; alula narrow, with short dense closely set cilia.

Atissa oahuensis new species (Page 58.)

Similar to *A. suturalis* Cresson, from Australia, but more uniformly gray, frontals more advanced cephalad, no antesutural dorsocentrals.

[14] By the kindness of Mr. Curtis W. Sabrosky of the U. S. National Museum, who visited me at the Academy of Natural Sciences of Philadelphia and brought the type of this species for my examination.

Antennae brownish and tarsi rather pale; halteres white; wings infumated. Pruinose vestiture gray except dorsal surfaces slightly brownish.

Setation well developed for the genus. Head higher than long, broader than high. Eyes large. Frons convex in profile, broader than long; ocellars slightly caudad and frontals slightly in advance, of line of anterior ocellus. Face, in profile somewhat prominent at epistoma, about .3 width of head, slightly carinate, orbits strongly flaring to narrow cheeks; setation about as described above for *antennalis*. Antennae situated about on center line of eyes; segment III discoid; arista short, thickened on basal half, with five short curved hairs. Mesonotal setulae strong, about six series between the intra-alars; following dorsal macrochaetae are present: presuturals, posterior intra-alars aligned with prescutellars, humeral, notopleurals, the posterior one well removed dorsad, but not in the sutural angle. Scutellum with few dorsal setulae; apicals parallel, the laterals well basad. Abdomen slender; tergites III, IV, V, equally long, rather quadrate, sparingly setulose, setae of V longer. Wings broad, distinctly pointed at vein III; costa II longer than III; alula very narrow with long cilia. Length, 1 mm.

Type.—Male; Tuna Packer's Pond, Kaneghei, Oahu, Hawaii; January 25, 1945; (Y. Tanada) [United States National Museum].

Two specimens badly shriveled and impossible to describe, even to sex, labeled: Kuapa Pond, Kuliouou, Oahu, Sta. 14, May 31, 1943, (Y. Tanada). These are not considered paratypes.

Allotrichoma nitidum new species (Page 57.)

A species unique among the Indo-australian *Allotrichoma* in being shining black, with very sparse brown dusting and a few definite cinereous markings.

Halteres knob and tarsi yellow to ferruginous. Wing veins dark. Frons slightly gray anteriorly, with frontalia opaque black. Face sparsely brown, lighter ventrad. Cheeks and post-bucca, more cinereous; clypeus shining. Antenna II cinereous dorsad. Humeri gray.

Frons quadrate; face slightly narrower; facial foveae and carina definite but shallow; two facials, low, the uppermost but slightly above line of buccal orbit. Arista with five hairs.

Mesonotal setulae difficult to see, but are seriated. Tergite IV in length about equal to II and III together. Wings rather short; costa II about two to three times as long as III. Vein II straight to costa. Length, 1.5 mm.

Type.—♂ ?; Simbang, Huon Gulf, New Guinea; (L. Biro); (1899) [Academy of Natural Sciences of Philadelphia, no. 6679].

Paratype.—1 ♂ ?; with same data as for type.

ELEPHANTINOSOMA

(Page 58)

1903. *Elephantinosoma* Becker, Mitt. Zool. Mus. Berlin, II, p. 179.

Elephantinosoma sp.

One specimen of this genus is before me from Lyallpur, Punjab, India, VIII, 15, [IIE] which is in too poor condition to describe or to determine its specific status.

Pectinifer niveifrons (Cresson) (Page 65.)

The orignal name of this species was erroneously constructed as *neiveifrons*.[15] It was corrected as a lapsus calami to *niveifrons* in my 1945 paper on above-mentioned page.

Psilopa incerta Becker (Page 68.)

1924. *Psilopa incerta* Becker, Suppl. Entom., XIII, p. 91. [Formosa.]
1925. *Psilopa dimidiata* Cresson (not Cresson 1922), Trans. Amer. Ent. Soc., LI, p. 248. [Formosa.]
1945. *Psilopa dimidiata* Cresson (not Cresson 1922), Trans. Amer. Ent. Soc., LXXX, p. 68.

This name should replace *Psilopa dimidiata* Cresson.

This species, belonging to the group with two pairs of stout facials, is distinguished from *dimidiata,* its nearest relative, by the cilia of whitish scale-like pubescence on the lateral (anterior and posterior) margins of the yellow hind metatarsus. This character is present in the females (the sex described by Becker, and the specimen I recorded in 1925). I have not seen any males, which may not possess this feature. The comparative lengths of the second and third sections of the costa (the former described as being 1.5 as long as the latter) do not agree in my individual.

Psilopa dimidiata was originally described from North America, but in 1925 I had recorded it from Formosa on an individual which did not seem to differ from the original series. At that time I recognized its similarity to *incerta* as described, but overlooked the characteristic tarsal ciliation which is not possessed by true *dimidiata*. In 1945 I again suspected the possibility of this species being distinct from *dimidiata*.

[15] These Transactions, LII, p. 251, 1926, intended for niveus = snow + frons.

Species Incertae

(Insert before *Ceropsilopa* on page 70)

Psilopa bella Becker, Entom. Mitt., XIII, p. 92, 1924. [Formosa.]

This species is probably a member of the Psilopini.

Psilopa giloipes Becker, Entom. Mitt., XIII, p. 91, 1924. [Formosa.]

This specific name was corrected, in ink, to *gilvipes,* in the copy of his paper sent to me by the author. This and *sorella* no doubt belong to the Psilopini; they both have elongate antennae (third segment described as 2 to 2½ as long as broad).

Psilopa irregularis Malloch, Ins. Samoa, VI, p. 314, 1934. [Samoa.]

The face is described as "microscopically transversely striate"; the legs piceous. Said by the author to possibly be *P. polita* (Macquart). It was also recorded by Bezzi from the Fiji Islands.[16]

Psilopa sorella Becker, Entom. Mitt., XIII, p. 91, 1924. [Formosa.]

See my note under *giloipes* above.

Discomyza maculipennis (Wiedemann) (Page 72.)

1824 (not 1821). *Notiphila maculipennis* Wiedemann, Anal. Entom., p. 57.
1868. *Discomyza pelagica* Schiner, K. Svenska Freg. Novara Resa, Zool., Dipt., p. 242.
1913. *Discomyza maculipennis,* Meijere, Bijdr. tot de Dierkund, XIX, p. 66. [Waigiu Island.]
1914. *Discomyza maculipennis,* Bezzi, Phil. Jour. Sci., VIII, (D), p. 332. (= ?*Discomyza obscurata* Walker, 1860. Celebes). [Philippine Islands.]
1926. *Discomyza maculipennis,* Bezzi and Lamb, Trans. Ent. Soc. London, 1925, p. 562. [Rodrigues Island.]
1928. *Discomyza maculipennis,* Bezzi, Dipt. Fiji Isl., p. 154. [Fiji Islands.]
1936. *Discomyza maculipennis* Cresson, Proc. Calif. Sci., (4), XXII, p. 53. [Solomon Islands.]

CEYLON: Mardode, [DEI?, 1]. Peradeniya, (N. K. Jardine, 1918), V 23, [IIE, 2]. FORMOSA: Anping, XI, (H. Sauter) [DEI, 1]. PHILIPPINE ISLANDS: Manila, (R. C. McGregor) [USNM, 1]. HAWAII, OAHU: Honolulu, (C. J. Bridwell); Kalihi, IV 2, V 21, (E. H. Bryan; bred from shells); Blant Waiplo, IX 22, (E. H. Bryan) [Bishop, 13; USNM, 2].

[16] Dipt. Fiji Isl., Brit. Mus. Pub., p. 155, 1928.

Species Incertae

(Page 72, before *Clanoneurum*)

Discomyza obscurata Walker, Jr. of Proc. Linn. Soc. London, Zool., IV, p. 169, 1860. [Celebes.]

This may be a synonym of *D. maculipennis* (Wiedemann) as suggested by Bezzi. See under that species.

Discomyza punctipennis Van der Wulp, Veth's Mid-Sumatra, IV, (9), p. 56, 1892. [Sumatra.]

Possibly conspecific with *D. maculipennis*. Unknown to me.

Discomyza tenebrosa Walker, Proc. Linn. Soc. London, Zool., VIII, p. 130, 1865. [New Guinea.] Cresson, Notulae Nat., Phila., no. 21, p 1, 1939.

Unrecognizable.

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STUDIES IN THE SCARABAEIDAE IV[1]

(COLEOPTERA)

BY MARK ROBINSON

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(Text-figures)

Five new species and one new subspecies are described in this paper along with notes on other Scarabaeidae. Unless otherwise mentioned the types are in the collection of the author.

Canthon chiapas new species

This species is allied to *indigaccus* Leconte but the pronotum and elytra are more shining due to the granular finish of these areas being reduced so that it is visible only under high magnification. Another dissimilarity is the pygidium which in Leconte's species is concave basally and concurve apically.

The male genitalia of the older species have the extreme tip of the lower section parallel in outline while *chiapas* has the extreme tip of the lower section flared outwards.

A little convex, ovate; shining except the head, pygidium and underparts which are subopaque; dark blue, though some of the specimens have a greenish tint to the head and pronotum, tarsi dark reddish.

Anterior edge of clypeus reflexed; medially triangularly emarginate, the angles on each side produced forward into a triangular shaped tooth. There is a raised, fimbriate line on the inside of the reflexed clypeal margin. The surface of the head is granular intermixed with a few fine punctures. Just inside the clypeal margin the surface is scabrous.

Anterior angles of the pronotum acute; sides rounded from apex to base, very little produced medially; base emarginate near the hind angles. The surface is very finely granular with a few fine punctures intermixed. There is no trace of the thoracic tubercle below the lateral margin.

[1] (I) Trans. Amer. Ent. Soc., LXIV, pp. 107–115, 1938. (II) Trans. Amer. Ent. Soc., LXVI, pp. 141–159, 1940. (III) Trans. Amer. Ent. Soc., LXXII, pp. 49–59, 1946.

Elytral striae barely indicated. The surface of the elytra is even more finely granulate than the pronotum and in some areas no trace of granulation can be seen.

Pygidium is well rounded from base to apex; surface is granulate about the same as the frons. Anterior tibiae tridentate, crenate above the third tooth and between the anterior two teeth. Posterior tibiae with one spur. Surface of underside about the same as on the pronotum.

MALE.—Spur of anterior tibiae acutely, triangularly emarginate at the tip.

FEMALE.—Spur of anterior tibiae feebly curved outwards, acute at the apex.

Length, 8.5 to 11.5 mm.; breadth, 5.5 to 6.2 mm.

Type.—♂; Chiapas, Mexico.

Allotype.—♀; Chiapas, Mexico, June 1935, (C. C. Hoffman).

Paratypes.—1 ♂, 1 ♀; Chiapas, Mexico, 2 ♂; Chiapas, Mexico, June 1935, (C. C. Hoffman). 1 ♂, 1 ♀; Rinconada, Mexico, (Hoge). 1 ♂, 1 ♀; Jalapa, Mexico, (W. Schaus).

Paratypes are deposited in the collection of the Academy of Natural Sciences of Philadelphia and the private collection of O. L. Cartwright.

Canthon assimilis [2] **incisus** new subspecies

This subspecies differs from the typical form by the anterior tibiae being gently dilated on the inner side from before the middle to the apex; in the typical form it is abruptly dilated. In addition this subspecies is a little smaller in size.

The claspers of the male genitalia of *incisus* are deeply incised on the outside when viewed from the posterior end. There is no trace of this incision in the older form. Due to this remarkable difference in the genitalia a larger series of specimens may prove *incisus* to be a good species.

Length, 11.8 to 13.9 mm.; breadth, 7.6 to 8.7 mm.

Type.—♂; Cuernavaca, Morelos, Mexico, July 1940.

Allotype.—♀; with the same data as the type.

Paratypes.—2 ♀; with the same data as the type.

Eucanthus greeni new species

This species differs from the older species *lazarus* Fabr. in having the genae more angular, the side margins of the thorax less explanate, the sinuation next to the hind angle less pronounced, the coarse punctures of the pronotum and elytral striae less coarse, the transverse pronotal grooves absent or barely indicated and the pronotal carina and tubercules are less sharply defined. In addi-

[2] Trans. Amer. Ent. Soc., LXXII, p. 49.

tion, the space between the elytral striae is more nearly even in the older species.

I take pleasure in naming this species after my friend J. Wagener Green who furnished me with the specimens used to write the description of this interesting new species.

Reddish-brown, the hairs yellowish-brown; shining.

MALE.—Anterior clypeal declivity short, followed by a high, parallel-sided horn which is bifurcated at the apex; the base of this horn has a few long hairs protruding from the punctures. Following this frontal horn is a smooth area margined posteriorly by a transverse carina. The sides of the genae are right-angled with the angle rounded.

Following the anterior pronotal declivity is a blunt, transverse carina and in line with this carina and between it and either side margin is a conical tubercle. The coarse punctures are limited to the anterior margin, the explanate side margins, the area behind the tubercles and a thin median strip from the carina to the basal margin. The punctures near the side margins have about half the rim raised, giving them a tuberculate appearance. The fine punctures are distributed over the entire area and are separated from five to seven times their diameters.

The distance between the third and fourth, fifth and sixth, and seventh and eighth elytral striae is greater than the distance between their adjacent striae, this being especially true of the space between the fifth and sixth striae which, just behind the humeral umbone, is nearly twice as wide as the width between the fourth and fifth striae. The striae are marked with crenate punctures while the intervals have a few fine punctures scattered over the surface.

Anterior tibiae five- or six-dentate; the spur is long and acute. Posterior tibiae with one transverse ridge on the upper edge.

FEMALE.—The same as the male except for the following features: The transverse carina on the female frons is a bifurcate tubercle of equal height with the frontal horn or sometimes even higher. The pronotal tubercles are not as well developed and the coarse punctures are larger and denser.

Length, 8.3 to 11.0 mm.; breadth, 4.9 to 6.4 mm.

Type.—♂; Jemez Mountains, New Mexico, July 26, (John Woodgate).

Allotype.—♀; Jemez Mountains, New Mexico, August 23, (John Woodgate).

Paratypes.—4 ♂, 5 ♀; Jemez Mountains, New Mexico, various dates from July 24 to September 22, (John Woodgate).

Paratypes are deposited in the collection of Mr. Green and in that of the Academy of Natural Sciences of Philadelphia.

Coelodes ovalis new species

Probably most closely allied to *castaneus* Westwood from which species it can be distinguished by its color and more densely punctured elytra.

Ovate; shining; black, with the clypeus and side margins of the thorax dark reddish, the underside reddish-brown.

Surface of clypeus transversely rugose, gradually diminishing until on the frons the surface is lightly and sparsely punctured. The pronotal surface is very minutely and sparsely punctured. The elytral punctures are placed in regular rows except the subsutural row which has the punctures very irregularly placed. These elytral punctures are annular and are separated by two or three times their own diameter.

Anterior tibiae tridentate, crenate between the teeth and above the third tooth. Anterior tibial spur curved outwards and downwards, acute at the tip.

Length, 5.6 mm.; breadth, 3.5 mm.

Type.—♀; El Valle, D. F., Venezuela, (G. Vivas-Berthier). [In the collection of Cornell University. Number 2404.]

Paratype.—♀; with the same data as the type.

Phyllophaga elizoria Saylor (Text-figs. 3 and 4.)

1906. *Lachnosterna pygidialis* Schaeffer, Trans. Amer. Ent. Soc., XXXII, p. 257.
1937. *Phyllophaga elizoria* Saylor, Rev. de Ent., VII, p. 321. (New name.)
1939. *Phyllophaga elizoria* Sanderson, not Saylor, Journ. Kans. Ent. Soc., XII, p. 11.

The above species was described from a unique male specimen collected at Indian River, Florida. Sanderson recorded three more male specimens collected at Melbourne, Florida. On April 8, 1947, I collected two males and a female of this species at Okeechobee, Florida at light. In addition I have seen two male specimens collected on March 6, 1946, at Lake Placid, Florida, by J. G. Needham and one male specimen collected on April 1, 1947, at Lake Placid, Florida, by J. W. Green.

As the female of this species has never been described the following is a brief description of this sex; it is taken from the specimen listed above and is designated the allotype.

Antennal club about two-thirds as long as the male's. The short spur on the posterior tibiae of the male is about three-fourths as long as the long spur, in the female this spur is about seven-eighths as long as the long spur. The penultimate segment has a transverse groove on either side of the median line. The tarsal claws are more strongly curved than the male's.

The genitalia of the female are of the same general shape as those of other species in this group, especially *aemula* Horn from which it differs in having the tips pointed while they are rounded in *aemula*.

The above comparisons were made with the type, which is deposited in my collection.

Phyllophaga okeechobea new species (Text-figs. 1 and 2.)

This species is most closely allied to *elizoria* Saylor but may be separated by the length of the antennal club which in the older species is one and one-half times as long as the stem. The reflexed clypeal margin of *elizoria* is interrupted medially while it is entire in the new species. The pronotum and elytra of *elizoria* are covered with long yellowish-brown hair while *okeechobea* has the pronotum and elytra covered with short, scale-like, white hair. The hairs on the pronotum of *elizoria* are from 1 to 1.5 mm. long while on *okeechobea* they are from .3 to .5 mm. long. The pronotum of *okeechobea* is more sparsely punctured and as each hair rises from a puncture it is less densely covered with hair. The claw of the new species is more strongly curved than the claw of the older species. In addition to the above differences the male genitalia of the two species are different, as shown in figs. 1–4.

Ovate; dark reddish-brown including the club of the antennae; shining.

Clypeal margin reflexed, entire, emarginate medially. Surface of head coarsely punctured; these punctures each bear a short yellowish hair and are separated by about one-third their own diameter.

Side margins of thorax widest about the middle, thence straight to the angles, strongly crenate. The surface of the pronotum is rather evenly punctured, the punctures being separated from two to three times their own diameters and each bearing a short, white, scale-like hair.

Elytral costae ill defined. Surface coarsely punctured, each puncture bearing a short, white scale-like hair.

Antennal club about as long as the stem. Anterior tibiae tridentate. Metasternum densely clothed with short, yellowish-white hair. Abdominal segments quite densely punctured, each puncture bearing a short whitish hair. Penultimate segment concurved throughout. Pygidium gently curved from base to apex, densely, finely punctured, each puncture bearing a short whitish hair. Hind tibiae with both spurs free and slender, slightly curved, the inner seven-eighths as long as the outer. The claws are strongly curved, the tooth small and nearer the base than the middle.

Length, 14 mm.; breadth, 7.5 mm.

Type.—♂; Okeechobee, Okeechobee County, Florida, April 8, 1947, (M. Robinson).

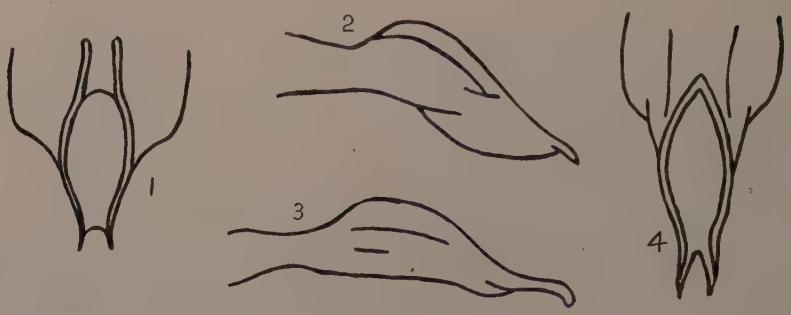

Fig. 1.—*Phyllophaga okeechobea* new species. Dorsal view of claspers. Fig. 2.—*Phyllophaga okeechobea* new species. Lateral view of left clasper. Fig. 3.—*Phyllophaga elizoria* Saylor. Lateral view of left clasper. Fig. 4. —*Phyllophaga elizoria* Saylor. Dorsal view of claspers.

Phyllophaga compostela new species

This species has been compared with a male, cotype of *Phyllophaga rubella* Bates from Toluca, Mexico, and the older species differs in the following points: the antennal club is about one and one-fourth as long as the stem, the clypeus is not nearly as strongly reflexed, the clypeus and head are very strongly and densely punctured, the pronotal punctures are finer and denser and the pronotum therefore is more densely hairy as each puncture bears a long yellowish hair. In addition the spurs of the hind tibiae are long and linear to the acute apex and the ultimate abdominal segment has a short, sharp, transverse carina arising from each side of the median line.

The genitalia of *rubella* have the inner points of the claspers placed well to the rear of the outer points when viewed sideways.

Ovate; a little shining; brownish with the head, thorax and legs reddish-brown, hairs yellowish.

Clypeus truncate in front with the angles broadly rounded, edges strongly reflexed. Punctures separated from one-half to three times their diameter, coarse, shallow. The punctures of the frons are separated by about one-half their diameters. All the punctures on the head and pronotum bear a long yellowish hair.

The side margins of the thorax are slightly sinuate before the angles and are barely crenate. The coarse, shallow punctures are separated from one to two times their own diameter; the hairs emerging from these punctures are longer on the disk than towards the sides.

Elytral costae indistinct. Surface coarsely, shallowly punctured, alutaceous.

Antennal club about one and three-fourths as long as the stem. The tooth of the claw sub-basal, short, triangularly acute. Both hind tibial spurs are free and the shorter is about two-thirds as long as the other, both distinctly widened at the middle. Ultimate abdominal segment with a blunt, raised line along the anterior edge which is narrowly interrupted medially.

Length, 13.5 mm.; breadth, 7.0 mm.

Type.—♂; Compostela, Nayarit, Mexico; 1936, (A. Maas).

The male genitalia of this species when viewed from the rear are seen to have four teeth or points on the lower side, the inner two much longer than the outer. When viewed from the side these four teeth are nearly in line.

STRIGODERMA Burmeister

1844. *Strigoderma* Burmeister, Handbuch der Entomologie, IV, part 1, p. 310.

1915. *Strigodermella* Casey, Memoirs Col., VI, p. 59.

Casey separated *Strigodermella* from *Strigoderma* by "elytra with few feebler, less defined and less regular striae; body very small in size." In addition he states, "the ligula is relatively longer and flat," although, as he admits, the species *pimalis,* which he assigned to *Strigoderma,* has the ligula flat.

The number of striae on the elytra, if Mexican and Central American species are taken into account, is very variable; *caster* which has the ligula relatively long and concave has from nine to ten deep elytral striae. *Strigoderma rutelina* has the ligula rather short and flat and has ten deep elytral striae; both of the last mentioned species are small in size. In going over the series of *Strigoderma arboricola* in my collection, I find the number of elytral striae varying from nine to twelve with none of these striae as well defined as they are in *caster,* nor are they as regularly placed.

When we compare specimens of our United States species of *Strigoderma* and *Strigodermella* they hold up very well as separated by Casey. On the other hand, when the series of species is broadened to include Mexican and Central American forms of this group, we find each individual point of differentiation between the genera is combined in such a way with each other as to render them all valueless except size. As the difference in size is not in itself enough to separate two allied genera, I propose to drop the name *Strigodermella* in favor of the older name of *Strigoderma* for the known species in this group.

Strigoderma pygmaea Fabricius

1798. *Melolontha pygmaea* Fabricius, Supp. Ent. Syst., Hafniae, p. 133.

On July 13, 1947, in company with Mr. R. C. Casselberry, I collected 29 ♂ and 21 ♀ of this species in the washup at Ocean City, N. J.

There seems to be a great deal of confusion concerning the identity of the female of this species and the following comments may help to straighten out this condition. The female at times is much lighter in color than the male, varying from a reddish-brown to a yellowish-brown with the same light-colored areas on the elytra. The larger anterior tarsal claw is scarcely thickened, a little longer than the short claw and cleft for about one-third its length. The larger intermediate tarsal claw is but little thicker than the short claw and not much longer, with the apex cleft for about one-fourth its length. The female anterior tibial spur is about one and one-half as long as the male. The female pygidium is more convex than the male but is sculptured about the same. The length of the female varies from 5.0 to 6.5 mm., while the breadth varies from 2.7 to 3.5 mm.

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THE GENUS CHOERIDIUM INHABITING THE UNITED STATES

(SCARABAEIDAE: COLEOPTERA)

BY MARK ROBINSON

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The genus *Choeridium* is entirely American in habitat and has quite a few species represented in tropical countries, but in the United States it has only three species and a geographic subspecies to date. The forms described herein as new do not agree with any other known to this author.

The following collections were consulted in the preparation of this paper: The Academy of Natural Sciences of Philadelphia, R. C. Casselberry, J. W. Green and that of the author.

Key to the Species and Subspecies

1. Area within the anterior and posterior angles of pronotum with many coarse punctures scattered over the surface.....3
2. Area within the anterior and posterior angles of pronotum with no or a very few coarse punctures scattered over the surface.....4
3. Hind angle of the thorax right angled; side margin of thorax when viewed sideways is nearly straight from front to hind angle.
   histeroides histeroides (Web.)

   Hind angle of the thorax broadly rounded; side margin of thorax when viewed sideways is curved downwards in the anterior and posterior thirds.....**lecontei** Harold

   Hind angle of the thorax not quite right angled; side margin of thorax when viewed sideways is gradually curved from the hind angle to about three-fourths the distance to the anterior angle, then turned upwards to the anterior angle.
   histeroides punctatus new subspecies
4. Hind angle of thorax broadly rounded; side margin of thorax when viewed sideways is nearly straight in the anterior two-thirds and then gradually curved upwards to the posterior margin.
   texanus new species

Choeridium texanus new species

The male genitalia of *texanus* are nearly the same as those of *histeroides,* while externally *texanus* resembles *lecontei.* The spur on the anterior tibiae of *lecontei* is wider than long in the male, while *texanus* has this spur longer than wide. The pronotal foveae in this species is about one half the size of the foveae in *lecontei.*

Ovate; shining; black, with the legs dark reddish.

Clypeus triangularly emarginate, the angles on each side produced into a blunt tooth. Surface of clypeus shallowly punctured behind the anterior margin, these punctures separated by about their own widths. Frons and genae very finely and sparsely punctured.

Side margins of thorax when viewed from above straight in basal two-thirds, gradually converging in front; when viewed sideways these margins are nearly straight in the anterior two-thirds and then gradually curve upwards to the posterior margin. There are a few coarse, shallow punctures near the anterior angles and along the posterior margin, these punctures obsolete near the angles in two of the specimens of the type series. The entire disk is covered sparsely with fine punctures, the punctures separated from eight to ten times their own diameters.

Elytra each with seven shallow striae, each of which has a few crenate punctures scattered along their length. Intervals barely convex; there are a few fine punctures scattered over the surface.

Pygidium evenly convex; finely and sparsely punctured. Propleurae transversely carinate, anteriorly concave. Anterior tibiae quadridentate, smooth above the fourth tooth. Abdominal segments densely punctured along their anterior margins, each puncture bearing a blackish hair.

MALE.—Anterior tibial spur ovate in outline, longer than wide.

FEMALE.—Anterior tibial spur elongate, anterior end bent inwards, apex acute.

Type.—♂; Brownsville, Texas; June 1913; (C. Schaeffer). In the collection of the author.

Allotype.—♀; Flatonia, Texas; July 30, 1911; (H. A. Wenzel). In the collection of the author.

Paratypes.—♂; southwest Texas. In the collection of the Academy of Natural Sciences of Philadelphia. 1 ♀; with the same data as the allotype. In the collection of the author.

Choeridium lecontei Harold

1868. *Choeridium lecontei* Harold, Berliner Ent. Zeitschr., p. 42.

Specimens of this species have been examined from the following states: New Jersey, South Carolina, Georgia and Florida.

Choeridium histeroides histeroides Weber

1801. *Scarabaeus histeroides* Weber, Observationes Entomologicae, etc., Kiliae, p. 37.

The species has been examined from localities in the following states: Pennsylvania, New Jersey, Virginia, North Carolina, Oklahoma and Texas. The pronotum has the punctures coarse near the angles, then they abruptly get smaller elsewhere on the disk. Another difference between this and the following form is the less strongly scribed striae and the finer strial punctures.

Choeridium histeroides punctatus new subspecies

This northern subspecies of *histeroides* can be separated from the typical form by the more coarsely punctured head and pronotum plus the differently shaped side margin of the thorax. The male genitalia of this and the preceding form are identical.

Ovate; shining; bronze, with the legs dark reddish.

Clypeus triangularly emarginate, the angles on either side produced into a blunt tooth. The surface of the clypeus is coarsely and densely punctured behind the margin; these punctures are separated by about three-fourths their own diameter just behind the margin. These coarse punctures gradually decrease in size and density posteriorly until between the eyes they are very fine and are separated by about three times their own diameter.

Side margins of thorax when viewed from above straight in basal three-fourths, then rather abruptly turned inwards to the anterior angle. When viewed sideways these margins are gradually curved from the hind angle to three-fourths the distance to the anterior angle where they are turned upwards. Inside the hind angles the posterior edge is sinuate. Surface of pronotum coarsely punctured near the angles, these punctures are confluent to being separated by about one-half their diameters. These punctures gradually get smaller and sparser until on the disk they are fine and separated by about three or four times their diameter.

Elytra each with seven sharp striae; these striae have a few crenate punctures scattered through their length. Intervals a little convex; scattered over the surface of the intervals are a few sparsely placed fine punctures.

Pygidium convex; finely punctured, these punctures separated by about three or four times their diameter. Propleurae transversely carinate, anteriorly concave. Anterior tibiae quadridentate, the fourth tooth barely visible. Abdominal segments coarsely, shallowly punctured laterad.

Male.—Anterior tibial spur ovate in outline, longer than wide.

Female.—Anterior tibial spur elongate, anterior end bent inwards, apex acute.

Type.—♂; Allegan, Allegan County, Michigan; July 30, 1912; (F. Psota). In the collection of the author.

Allotype.—♀; with the same data as the type.

Paratypes.—1 ♂, 1 ♀; with the same data as the type. 1 ♂, 2 ♀; Lawrence County, Illinois; August 15, 1941. 1 ♂, 1 ♀; Rockville, Pennsylvania; May 20, 1910.

Paratypes are deposited in the collections of the Academy of Natural Sciences of Philadelphia, J. W. Green, O. L. Cartwright, R. C. Casselberry and the author.

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A REVIEW OF THE GENUS MONIAECERA

(HYMENOPTERA: SPHECIDAE: PEMPHILIDINI)

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(Text-figures)

The genera *Euplilis, Podagritus,* and *Moniaecera* form a compact unit distinguishable from all other Pemphilidine wasps by their slender, attenuate habitus, elongate, petioliform abdomen, three-segmented labial palpi, and five-segmented maxillary palpi. Hitherto all Pemphilidini possessing this distinctive combination of characters have been assigned to the genus *Rhopalum,* now correctly termed *Euplilis.* But as I have recently demonstrated elsewhere,[1] analysis of the morphological, biological, and distributional features displayed by each of these groups indicates the existence of three discrete entities, each worthy of being accorded full generic rank.

The genus *Euplilis* is a cosmopolitan complex of hygrophilous to mesic forms apparently capable of living through a wide range of temperature conditions in contradistinction to the xerophilous, stenothermal *Moniaecera* which is restricted to the Sonoran Region of North and Middle America, and to *Podagritus* which is confined to the Australian and Neogaeic Realms, particularly to the Chilean and adjacent regions of the latter area. Moreover, these last two genera are fossorial, terricolous assemblages whereas *Euplilis* has developed a xylicolous habit. In addition, each complex has congeries of morphological features such as the structure of the mandibles, occipital carina, and prepectus, the shape of the abdomen and hind tibiae, and the wing venation which enable them to be readily distinguished from one another. Consequently, to continue lumping all the species referable to these three groups

[1] Conspectus of the genera of Pemphilidine Wasps. Amer. Midl. Nat., XXXI, pp. 329–384, (1944).

under the generic name *Euplilis* can give no adequate picture of the phylogenetic history of each.

The most distinctive, as well as the most misunderstood, of these three genera is the precinctive North American complex *Moniaecera,* first recognized as a discrete entity by Fox in 1895 and later accorded full generic status by Ashmead in 1899. However, most subsequent investigators have failed to recognize the validity of Ashmead's genus. To resolve this long-standing miscomprehension of one of our most interesting endemic genera of Pemphilidine wasps, I offer here a review of Ashmead's *Moniaecera.*

This study is based on material in the collections of the Academy of Natural Sciences of Philadelphia and Cornell University. To Dr. P. H. Timberlake of the University of California's Citrus Experiment Station at Riverside, California, Dr. R. W. Strandtmann of the Medical School of the University of Texas at Galveston, Texas, and Dr. E. A. Chapin, Curator of Insects at the United States National Museum, Washington, D. C., I wish to express my sincere thanks for their kindness and courtesy in permitting me to study their collections.

MONIAECERA Ashmead

Crabro (20. Group *abdominalis*) Fox, Trans. Amer. Ent. Soc., XXII, p. 198, (1895).

Rhopalum (*Crabro*) Hartman, Bull. Univ. Texas, no. 65, Sci. Ser. no. 6, p. 43, (1905).

Rhopalum (*Moniaecera*) Rohwer, Ent. News, XX, p. 323, (1909).

Euplilis Pate, Mem. Amer. Ent. Soc., no. 9, p. 41, (1937). [In part.]

Moniaecera Ashmead, Canad. Entom., XXXI, p. 220, (1899).—Pate, Amer. Midl. Nat., XXXI, p. 353, (1944).

GENOTYPE: *Crabro abdominalis* Fox, 1895 [= *Moniaecera* (*Moniaccera*) *abdominalis* (Fox)]. (By original designation of Ashmead.)

The superficial habitus of *Moniaecera* is very similar to that of *Euplilis,* but the large, cubical head with the occipital carina well-developed, more or less flanged and a complete circle in extent, the sharply margined prepectus, the simple obterete hind femora, and the peculiar structure of the mandibles which are armed on the inner basal margins with an elongate, acuminate, retrorse tooth distinguish *Moniaecera* from that genus.

Generic Characters.—Small, slender forms. Head cubical; eyes naked or very finely and sparsely puberulent under high magnification (generally more noticeably so in females than in males), and more coarsely facetted anteriorly than posteriorly; inner orbits strongly convergent below; malar space reduced to a mere line. Front very narrow, concave but without a marginate scapal sinus; usually armed medially below, just above antennal sockets, with a declivent, spinoid or dentoid process. Vertex flat, usually coarsely punctate; supra-orbital foveae distinct in females, usually rather weak or absent in males; ocelli moderately large, arranged in a low or high triangle. Temples well-developed, ecarinate; occipital carina well-developed, more or less flanged and a complete circle in extent, but on midventral line separated from, and not tangent to, the hypostomal carinule bordering the oral fossa. Antennae situated low on face on dorsal margin of clypeus, the sockets contiguous to each other and to nearest lower inner orbit; thirteen-segmented in males, and twelve-segmented in females; scapes slender, cylindrical, elongate, ecarinate lengthwise; flagellum simple in females but with some of segments often modified in males. Clypeus reduced laterally to a mere line by a deep arcuate excision; medially with a very short, flat to tumid, subhexagonal lobe, the lateral margins of which are double as a result of a deep pocket which accommodates the long, acuminate basal spine of the inner mandibular margin. Maxillary palpi with five, labial palpi with three segments. Mandibles slender, elongate; apices bidentate in both sexes, the lower tooth often strongly divergent from the straight upper one; armed basally on inner margins with an elongate, retrorse, acuminate tooth; lower margins entire, in females frequently with a small tooth at extreme base. Females without a psammophore.

Thorax robust, compact; often more or less coarsely punctate. Pronotum short, transverse; anterior dorsal margin usually rounded, ecarinate, but humeri frequently dentate, angulate, or carinate. Mesonotum often coarsely punctate; axillae small, immarginate laterally; scutellum and postscutellum simple. Mesopleura frequently coarsely punctate; prepectus always sharply margined anteriorly; mesopleural pit and episternal suture distinct and impressed; episternauli, mesopleurauli, and sternauli absent; metapleura finely sculptured. Propodeum usually finely sculptured; dorsal face without, or with only a poorly defined, trigonal enclosure; posterior face with a discal fovea or impression; lateral carinae present or absent.

Wings rather short, generally not reaching beyond caudal margin of second or third abdominal tergite. Fore wings with marginal cell at least three times as long as wide, broadly truncate at apex; transverse cubital vein oblique, inclivous; cubitus with second abscissa as long as, or longer than, first abscissa. Hind wing with anal lobe elongate-oval, distinctly separated, and as long as the short submedian cell.

Legs relatively simple in both sexes. Fore tarsi simple, neither flattened nor distorted; in females with a weak pecten. Middle and hind tibiae simple, obterete, their outer face often strongly spinose in females; middle tibiae with one calcar, hind tibiae with two calcaria in both sexes.

Abdomen slender, elongate, petiolate; impunctate or at most very finely punctate; immaculate black or black and red. First segment elongate-petioliform, weakly subnodose at apex, but not separated from second segment by a very strong constriction; remainder of abdomen fusiform in females, clavate in males. Tergites without basal acarid chambers. Females with a broad, flat, coarsely punctate, trigonal pygidial area. Males generally without a pygidial area on ultimate tergite; seventh sternite flat, broadly, transversely subrectangular; hypopygium flat, ligulate or spatulate, the apex entire, fringed with hair, the apical half of disc setose.

Ethology.—Although relatively highly specialized morphologically, *Moniaecera* has remained terricolous and fossorial in sharp contrast to its close relative, the cosmopolitan *Euplilis* which has developed xylicolous habits. But whereas there is a wealth of data on the biology of the latter genus, the only biological information on any species of *Moniaecera* is the observations made many years ago by Carl Hartman on *Moniaecera abdominalis*.[2]

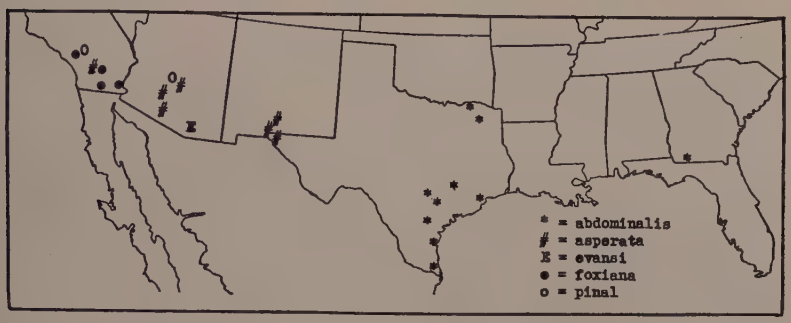
In the sandy woods five miles southeast of Austin, Texas, on the high south bank of the Colorado River, Hartman found *abdominalis* nesting in relative abundance during the months of August and September. The nests were constructed in the middle of a small, flat elevation of sand. The entrance tunnel penetrated the soil nearly horizontally for about two and a half inches and then descended vertically for four inches with a uniform diameter of 2 mm. At the bottom of the tunnel was a small pocket in which were stored a number of leaf-hoppers [*Kolla bifida* (Say)].

While hunting for prey, *abdominalis* leaves the entrance to her burrow open. On her return to the nest, the female hovers briefly in the air about five inches above the nesting hole and then plunges rapidly down into the nest, reappearing again in a few seconds to resume her foraging activities. Rarely is there any locality study made before leaving the nesting site. The activities of *abdominalis* when out hunting are very similar to those of *Trypoxylon:* like many species of that genus, *abdominalis* is almost constantly on the wing and displays her curiosity by touching every stick or blade of grass in her path with her antennae.

The species of *Moniaecera* probably have at least two generations a year. Adults of most species are on the wing during the spring or early summer months, from March to the first week of

[2] Bull. Univ. Texas, no. 65, Sci. Ser. no. 6, pp. 43–44, (1905).

June; many of these apparently have another generation in August, September or early October, just after the late summer or early autumn rains.



Distribution of the species of the subgenus *Moniaecera*.

Distribution.—The genus *Moniaecera* is a precinctive Nearctic complex confined largely to the southern portion of North America and with its epicentre apparently in the southwestern United States. Though probably more widespread in the past, the present limitation of *Moniaecera* to the southern portion of the Sonoran Region is probably the result of Pleistocene glaciation. Moreover, the relative instability of the isthmian link in the Tehuantepec area throughout the Tertiary has presumably been one of the major factors in preventing its expansion further southward in Middle America than southern Mexico.

The species of *Moniaecera* are thermophilous, stenothermal forms which occur mainly in the arid or semiarid areas of the southwestern states and adjacent regions of Mexico. Only one species, *abdominalis,* which ranges from eastern Texas through the Gulf Coastal plain to southern Georgia, has adapted itself in any degree to mesophytic conditions: the remaining forms inhabit the more xeric areas stretching from the Upper Rio Grande Valley to the Colorado Desert in southern California. This xerophilous habit is in sharp contrast to that of its close relative, the eurythermal, mesophilic, ubiquist *Euplilis.*

Within the genus are two very distinct and well-marked groups which give every appearance of being natural entities. Each of

these, I believe, is worthy of being accorded subgeneric rank. The more generalized of the two is undoubtedly the nominate complex. These subgenera are differentiated in the following key and discussed on the ensuing pages.

Key to Subgenera

Mesosternum transversely carinate anteriorly; mesopleura with well-developed hypersternauli, and a posterior epicnemium formed by a vertical carinule descending from the mesopleural pit to the precoxal carina.....**Huavea** new subgenus

Mesosternum rounded anteriorly; mesopleura without distinct hypersternauli and no such posterior epicnemium nor precoxal carina before middle coxae.....**Moniaecera** s. s.

Subgenus **Moniaecera** *sensu stricto*

The more coarsely punctate head and thorax, the ordinary structure of the mesopleura and mesosternum, and the simple pygidium of the males distinguish the nominate complex of *Moniaecera* from the Mexican subgenus *Huavea.*

Subgeneric Characters.—Fulgid forms, with the head and thorax generally more coarsely punctate than in *Huavea.* Head with upper front usually bisected by a furrow running forward from anterior ocellus to facial basin. Ocelli generally arranged in a lower triangle (average ratio: 3.5 : 2.0) than in *Huavea;* ocellocular line at most subequal to, but generally distinctly less than, postocellar distance.

Mesopleura without well-developed hypersternauli and lacking a posterior epicnemium formed by a vertical carinule; no precoxal carina before middle coxae. Mesosternum rounded, ecarinate anteriorly. Propodeum with lateral carinae absent or at most vestigial.

Abdomen with first sternite subequal in length to first tergite, and generally more or less angulate medially in lateral aspect, the apex not abruptly inflexed. Males with last abdominal tergite flat or arcuate in cross section and without a pygidial area, either impressed or otherwise.

Component Species.—The nominate subgenus of *Moniaecera* comprises at present five species, all of which are North American in distribution. However, when the ranges of these forms are more fully known, a number of them will probably be found to occur in northern Mexico.

The five species referable to the subgenus *Moniaecera* are divisible into three groups. The Pinal Group, which includes only the nominate form, lacks a frontal spine, has the oral fossa moderate

in depth, and the males have the hypopygium simple, ligulate, and the genitalia have the parameres thick, terete, tapering sharply to acute apices which do not surpass the apex of the thick, terete aedoeagus; the digiti are slender and uncinate at apex.

The Asperata Group comprehends three species: *asperata, foxiana,* and *evansi.* All of these bear a median frontal process just above the antennal sockets, and the oral fossa is moderate in depth. The males have the hypopygium more or less strongly spatulate, and in the genitalia, the parameres are large, depressed, flattened, and laminate, far surpassing in length the simple tubular aedoeagus, the apex of which may be incrassate; the digiti are slender and acuminate apically.

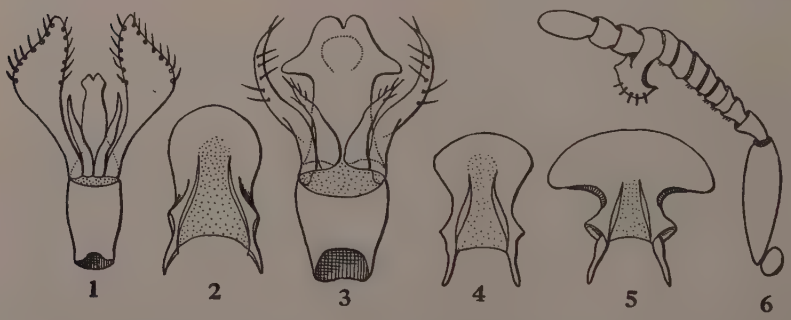
The Abdominalis Group, which comprises only the typical species, bears a median frontal process just above the antennal sockets but the oral fossa is quite deep. The hypopygium of the males resembles that of the Asperata Group but the male genitalia are markedly different; the parameres are very slender, curved and acuminate, and subequal in length to the peculiar aedoeagus which is thick and tubular at base but strongly depressed and flattened at apex where it suddenly becomes subhastate in shape with the apex broadly rounded; the digiti are simple and acuminate.

The subjoined table will serve to separate these five presently known forms.

Key to Species

1. Antennae thirteen-segmented; seven abdominal tergites visible; (males) 2
   Antennae twelve-segmented; six abdominal tergites visible; (females) 6
2. Front without a supra-antennal tooth or process; fore coxae simple, edentate; (Arizona to southern California) ..... **pinal** Pate
   Front armed medially just above antennal sockets with a declivent tooth or spine 3
3. Fore coxae edentate, without an anteromedian tooth or tubercle; antennal pedicel cylindrical or obterete, not obtusely angulate on outer lateral face 4
   Fore coxae armed with a median tooth, tubercle, or ridge anteriorly along median line; antennal pedicel obtusely angulate on outer lateral face 5

4. Antennal flagellum simple, none of the segments modified; middle metatarsi simple, slender, elongate; pronotal humeri sharply dentate or angulate; (Texas to Georgia).....**abdominalis** (Fox)
   Antennal flagellum modified, medially with a laminate, unciform process; middle metatarsi short and thickened; pronotal humeri rounded; (southern Arizona).....**evansi** Pate
5. Antennal flagellum with apex simple; (southern California). **foxiana** new species
   Antennal flagellum with apex strongly compressed and more or less spatulate; (western Texas to southern California)..**asperata** (Fox)
6. Mandibles beneath at base with a distinct tooth; pronotal humeri more or less angulate or dentate.....7
   Mandibles beneath at base simple, edentate; pronotal humeri rounded. **foxiana** new species
7. Head beneath, laterad of oral fossa, with a transverse callus or welt; oral fossa shallow, campanulate, apparently broader anteriorly than deep.....**asperata** (Fox)
   Head simple beneath, quite flat laterad of oral fossa which is deep, apparently narrower anteriorly than deep.....**abdominalis** (Fox)



Moniaecera evansi Pate: Fig. 1.—Male genitalia, ventral aspect. Fig. 5.—Male hypopygium, ventral aspect. Fig. 6.—Antenna of male.

Moniaecera abdominalis (Fox): Fig. 2.—Male hypopygium, ventral aspect. Fig. 3.—Male genitalia, ventral aspect.

Moniaecera asperata (Fox): Fig. 4.—Male hypopygium, ventral aspect.

Moniaecera (Moniaecera) pinal Pate

Moniaecera pinal Pate, Notulae Naturae, Phila., no. 185, p. 10, (1947); [♂: Arizona].

Type.—♂; Phoenix, Maricopa County, Arizona. Elevation, 1108 feet. April 20. [Academy of Natural Sciences of Philadelphia, Type no. 10591.]

The absence of a supra-antennal spine, the almost impunctate upper front and vertex, and the rather finely punctate thorax easily differentiate this recently described form from all other species of the genus.

The above characteristics coupled with the simple linguiform male hypopygium and the terete parameres and aedoeagus and uncinate digiti of the male genitalia indicate that *pinal* undoubtedly forms a group distinct and apart from the other species of the nominate complex.

Distribution.—This vernal xerophile ranges across the Sonoran and Colorado Deserts of southern Arizona and California and into the piedmont of the Transverse Ranges district of southern California.

Specimens examined: 5 males, as follows:

ARIZONA: Phoenix, Maricopa Co.; elevation, 1108 ft.; April 20: 1 ♂; [*type,* ANSP].

CALIFORNIA: Riverside, Riverside Co.; March 23, 1926; (P. H. Timberlake; flying near *Scrophularia*) : 1 ♂; March 31, 1939; (P. H. Timberlake; on *Cryptantha intermedia*) : 1 ♂; April 2, 1930; (P. H. Timberlake; sunning self on rock) : 1 ♂. Lovejoy Buttes; May 11, 1944; (P. H. Timberlake; on *Stillingia paucidentata*) : 1 ♂. [All PHT.]

Moniaecera (Moniaecera) foxiana[3] new species

This southern Californian species is very closely related to the widely distributed *asperata,* but the simple, unmodified flagellum of the males and the edentate inferior mandibular margins of the females stamp it as a discrete species. In addition, the males of *foxiana* have the head more coarsely punctate than in *asperata,* and the dorsal face of the propodeum finely, obliquely carinulate, while the females lack transverse welts or tori on the post-temporal region of the head.

Type.—♂; Indio, Salton Sink, Riverside County, California. 75 feet below sea level. May, 1910. [Academy of Natural Sciences of Philadelphia, Type no. 10607.]

MALE.—Length 5 mm. Head and thorax cyaneous; abdomen, legs and antennae blackish-brunneous. Following stramineous: mandibles save red apices; fore femora with a spot above at apex; fore tibiae and tarsi entirely; middle and hind tibiae narrowly annulate at base; middle and hind metatarsi

[3] Dedicated to the late William J. Fox, formerly Librarian of the Academy of Natural Sciences of Philadelphia, as a slight tribute to his outstanding work upon these wasps and many other groups of Aculeate Hymenoptera.

and the following tarsal segment (third to last segments brunneous). Tegulae fulvous; axillary sclerites eburneous. Wings clear hyaline, iridescent; fore wings with stigma and veins, except for eburneous subcosta, light fulvous; hind wing veins eburneous.

Head fulgid; clypeus, and inner orbits with appressed silvery sericeous pile; vertex with a very thin clothing of short, suberect hairs; temples with a moderately heavy vestiture of decumbent silvery pubescence. Front very strongly concave between inner orbits but facial basin impunctate and not strigose; just above antennal sockets with a moderate, declivent spine, flattened above; upper front and vertex to behind postocellar line bisected by a strong, deep furrow, and with coarse scattered punctures which become closer and rather coarsely, transversely striatopunctate posteriorly in occipital region; ocelli situated in a low wide triangle, the ocellocular line about three-fourths (0.77) the postocellar distance. Occipital carina moderately flanged, separated below from apex of the broad, subequilaterally trigonal oral fossa. Temples with moderately fine, close punctures; post-temporal region very sparsely punctate. Antennae with scapes subcylindrical, the upper halves shallowly, arcuately excised, six-tenths the vertical eye length; pedicel obterete, with an obtuse angulate production, haired at tip, laterally; flagellum with all segments simple, unmodified; relative lengths: scape 18; pedicel 3; flagellar segment one 4, two 3, three 3, four 3, nine 2.5, ten 2.5, eleven 5. Clypeus short; median length one-sixth the vertical eye length; linear laterally, deeply emarginate on each side of the slightly tumid, truncate median lobe.

Thorax fulgid; dorsally with a thin vestiture of short, suberect, silvery hair; the pleura with a heavier vestiture of decumbent silvery pubescence. Pronotum with distinct, moderate puncturation; rounded, ecarinate anteriorly; humeri rounded. Mesonotum with moderately coarse punctures throughout; scutellum tumid, with anterior margin deeply impressed and foveolate, disc punctured like mesonotum, weakly margined laterally; postscutellum granulose, flat. Mesopleura with finer puncturation than mesonotum; episternal suture impressed; metapleura glabrous, horizontally striate. Propodeum without trigonal enclosure; dorsal face with anterior margin edged by a row of foveolae from which diverge backward strong striae or fine oblique carinulae; posterior face obliquely striate above, granulose below, bisected by a deep, immarginate, pyriform impression; lateral carinae absent above, vestigial below; lateral faces subgranulose.

Legs simple. Fore coxae with a small tooth or spine anterio-medially. All tarsi simple unmodified. Longer calcar of hind tibiae two-thirds the length of slender hind metatarsi which are one-half the length of four distal segments combined.

Fore wings with marginal cell three and a third times as long as wide; radius with first abscissa eight-tenths the length of second; third abscissa (truncation) about three-eighths (0.36) the length of second; transverse cubital vein one-third the length of second abscissa of cubitus which is one and a third times the length of first cubital abscissa.

Abdomen fulgid; subglabrous; impunctate; tergites with microscopic transverse aciculation. Last tergite semicircular, flat, without a pygidial area, the disc with scattered, coarse punctures. Fifth and following sternites hirsute apically.

Allotype.—♀; Yuma Indian Reservation, Imperial County, California. May 3–5, 1918. (J. C. Bradley.) [Cornell University.]

FEMALE.—Length 6 mm. Agrees with the male (type) except as follows:

Head, thorax, and first abdominal segment black, remainder of abdomen ferruginous, the second and fifth tergites brunneous discally. Stramineous: mandibles except red apices; fore legs distad of apical third of femora; middle tibiae on outer faces and first two tarsal segments; hind tibiae broadly annulate at base and first two tarsal segments. Antennae brunneous. Tegulae and axillary sclerites fulvous, and also stigma and all veins of fore wings.

Head more cuboidal; vertex more sparsely punctate. Ocellocular line about seven-tenths (0.72) the postocellar distance. Post-temporal region impunctate, without tubercles or welts; oral fossa very broad and shallow. Antennae simple; scape two-thirds the vertical eye length; pedicel not obtusely angulate as in male; flagellum with segments unmodified; relative lengths: scape 20; pedicel 5; flagellar segment one 5, two 4, three 3, four 3, eight 3, nine 3, ten 5. Mandibles edentate beneath at base.

Thorax and propodeum as in male.

Legs simple. Fore coxae without a spine or tooth anteriorly. Fore tarsi with a very weak pecten. Middle and hind tibiae moderately spinose on outer faces.

Fore wings with marginal cell four times as long as wide; radius with first abscissa subequal in length to second, third abscissa three-tenths the length of second; transverse cubital vein one-fourth the length of second cubital abscissa which is one and a half times the length of first abscissa of cubitus.

Abdomen on last tergite with a broad, subequilaterally trigonal pygidial area, the disc with sparse and scattered, coarse punctures.

Distribution.—This species is a late vernal to early aestival xerophile which ranges from the piedmont of the Transverse Ranges district southward throughout the Colorado Desert and the Salton Trough in southern California.

Specimens examined: 16; 13 males, 3 females, as follows:

CALIFORNIA: Claremont, Los Angeles Co.; (C. F. Baker): 2♂; [CU]. Indio, Salton Sink, Riverside Co.; 75 ft. below sea level; May, 1910: 1♂; [*type,* ANSP]; May 1–2, 1918; (J. C. Bradley): 2♂; [CU]. Colorado Desert, five miles south of Palm Springs, Riverside Co.; June 8, 1930; (P. H. Timberlake; in the shade of a leafy plant, *Dicoria canescens*): 1♂; [PHT]. Experiment Farm, Imperial County; May, 1911, May 23, 1912–

June 1, 1912; (J. C. Bridwell; visiting glandular hairs of *Helianthus annuus* [common sunflower]) : 2♀, 5♂; [USNM]. Yuma Indian Reservation, Imperial Co.; May 3–5, 1918; (J. C. Bradley) : 1♀ (*allotype*), 2♂; [CU].

The paratypic specimens agree with the types in all essential features of livery and structural detail.

Moniaecera (Moniaecera) asperata (Fox) (Fig. 4.)

Crabro asperatus Fox, Trans. Amer. Ent. Soc., xxii, p. 199, (1895); [♂; Las Cruces, New Mexico.]
Moniaecera asperatus Ashmead, Canad. Entom., xxxi, p. 220, (1895).
Rhopalum (*Moniaecera*) *asperatus* Rohwer, Ent. News, xx, p. 323, (1909).

The dentate fore coxae and the compressed subspatulate terminal flagellar article of the male and the callate post-temporal region of the female readily differentiate *asperata* from all other species of *Moniaecera*.

Type.—♂; Las Cruces, Dona Ana County, New Mexico. Elevation, 3883 feet. August. (T. D. A. Cockerell.) [Academy of Natural Sciences of Philadelphia, Type no. 4699.]

Male. Length 5 mm. Black; head and thorax with greenish, and propodeum with bluish, reflections; legs exclusive of maculation, and second and third abdominal segments, strongly tinged with fuliginous. The following stramineous: mandibles except red apices; fore and middle femora narrowly annulate at apex; fore tibiae entirely save for a dark brown medial spot on inner side; middle and hind tibiae broadly annulate at base; fore tarsi completely; middle and hind metatarsi entirely, and following two segments annulate at base. Light brunneous: antennae; tegulae; spot on axillary sclerites. Last abdominal segment testaceous. Wings clear hyaline, iridescent: fore wing with veins and stigma very light fulvous, the costa and other veins lacteous at base. Hind wing with veins lacteous.

Head fulgid; clypeus, and inner orbits with a broad band of silvery sericeous pile; vertex posteriorly, and temples thinly clad with erect to decumbent silvery hair. Front strongly concave between inner orbits, not transversely strigose, medially just above antennal sockets with a large, slender, declivent spine, flattened above; upper front bisected by a strong furrow from median ocellus, and with scattered coarse punctures; vertex with coarse, rather close though scattered punctures which are closer and finer posteriorly; postocellar line bisected by a fine furrow; ocellocular line seven-ninths (0.77) the postocellar distance. Temples finely punctate; occipital carina weakly flanged, a complete circle in extent and not tangent below but distinctly separated from the hypostomal carinule bordering the subequilateral subtrigonal oral fossa and connected to apex of latter by a short longitudinal carinule. Antennal scapes three-fifths the vertical eye length,

ecarinate, slender, elongate—subfusiform with apical half broadly, shallowly concave; pedicel obterete; flagellum with all segments simple except last which is strongly compressed, flattened, and acinacicate; relative lengths: scape 17; pedicel 4; flagellar segment one 3, two 2.5, three 2.5, nine 2.5, ten 3, eleven 6. Clypeus short; median length about one-fifth (0.214) the vertical eye length, linear laterally and deeply emarginate on each side of the flat, truncate median lobe.

Thorax fulgid; dorsally with a moderate vestiture of short, erect, silvery hair; pleura and sterna more heavily clad with decumbent silvery pubescence. Pronotum distinctly punctate; dorsal face flat, not notched medially, the anterior margin rounded to subangulate but not transversely carinate, the humeri rounded, edentate. Mesonotum with rather coarse, close, evenly disposed punctures throughout; scutellum more sparingly punctate; postscutellum finely, closely punctate. Mesopleura with close, even puncturation throughout, finer than that of mesonotum; episternal suture impressed, foveolate; prepectus sharply margined anteriorly; metapleura glabrous, horizontally costulate. Propodeum glabrous; with fine favose sculpture throughout; dorsal face without a trigonal area, anterior margin with a row of foveolae from which radiate fine striae curving out and down onto posterior face which is bisected by a strong and deep, immarginate, lenticular impression; lateral carinae vestigial.

Legs relatively simple. Fore coxae sharply dentate medio-anteriorly; femora subfusiform; tibiae obterete, the hind pair rather strongly spinose on outer faces. Middle metatarsi elongate, slender-arcuate. Longer hind tibial calcar two-thirds length of hind metatarsi which are four-fifths length of four distal segments combined.

Fore wings with marginal cell four times as long as wide and squarely truncate at apex. Radius with first abscissa seven-twelfths (0.581) the length of second abscissa; third abscissa (truncation) one-third length of second abscissa; transverse cubital vein oblique, inclivous, about two-fifths (0.415) the length of second abscissa of cubitus; first cubital abscissa two-thirds length of second.

Abdomen subfulgid, subglabrous, impunctate. Tergites with very fine transverse aciculation; last tergite subsemicircular, coarsely punctate, without a pygidial area. Apical sternites fringed with hair. Hypopygium subsemicircular, the apex entire.

Allodigm.—♀; Mesilla Park, Dona Ana County, New Mexico. Elevation, 3865 feet. June 9, 1898. (T. D. A. Cockerell; at flowers of *Chilopsis linearis* [Desert willow].)

Female. Length 6 mm. Agrees with the type (male) except as follows: Livery generally the same but second, third, fourth, and sixth abdominal tergites and all of abdominal venter ferruginous.

Head larger and more cuboidal. Upper inner orbits with distinct, deeply impressed, linear supraorbital foveae; ocellocular distance almost three-fifths (0.581) the postocellar line. Occipital carina distinctly flanged and well

separated medioventrally from apex of the broad and shallow oral fossa which is four times as wide anteriorly as its depth medially; post-temporal region laterad of oral fossa subpolite and with a transverse welt or low tubercle on each side. Antennal scapes slender, elongate, subcylindric throughout, ecarinate, seven-tenths the vertical eye length; pedicel obterete; flagellum with all segments simple; relative lengths: scape 19; pedicel 5; flagellar article one 3.5, two 3, three 3, eight 4, nine 4, ten 5. Clypeus short; one-seventh vertical eye length; the disc tumid medially; apical margin broadly, shallowly excised and subbevelate. Mandibles with lower apical tooth smaller and divergent from upper; lower margin with a large strong tooth beneath at base.

Thorax punctured as in male. Pronotum with a short furrow just behind the subangulate to subdentate humeri. Propodeum with striae of dorsal face stronger and more noticeable; no trace of lateral carinae.

Legs as in male but with middle and hind tibiae more strongly spinose. Fore coxae edentate; fore tarsi with a very weak pecten; middle metatarsi straight to barely arcuate. Longer hind tibial calcar six-tenths the length of slender elongate hind metatarsi.

Fore wings with marginal cell three times as long as wide and broadly, squarely truncate at apex. Radius with first abscissa five-sixths (0.83) the length of second abscissa; third abscissa (truncation) one-third length of second; transverse cubital vein one-fourth the length of second cubital abscissa which is one and a half times the length of first abscissa of cubitus.

Abdomen subglabrous, impunctate. Last tergite with a broad, flat, trigonal pygidial area, the disc with scattered, coarse punctures.

Distribution.—The range of *asperata* extends from the Upper Rio Grande Valley in New Mexico, across the Mexican Highlands and Sonoran Desert of southern Arizona and California, and into the Salton Trough. The dates when the following material was taken indicate that *asperata* has at least two generations a year: one in early or middle spring, and another late in the summer.

Specimens examined: 26; 11 females, 15 males, as follows:

Texas: El Paso, El Paso Co.; elevation, 3698 ft.; July 11, 1917: 1♀; [CU].

New Mexico: Mesilla Park, Dona Ana Co.; elevation, 3865 ft.; June 9, 1898; (T. D. A. Cockerell; at flowers of *Chilopsis linearis* [Desert willow]): 1♀; (C. N. Ainslie): 2♀; [USNM]. Mesilla; August 5; (T. D. A. Cockerell; at flowers of *Solanum elaeagnifolium* [white horse-nettle]): 1♂; [USNM]. Las Cruces, Dona Ana Co.; elevation, 3883 ft.; August; (T. D. A. Cockerell): 2♂ [*type* and *paratype,* ANSP], 1♀; [USNM].

Arizona: Tempe, Maricopa Co.; elevation, 1159 ft.; August 3, 1917: 1♀; [CU]. Maricopa Mts., Maricopa Co.; April 13, 1947; (H. K. & M. Townes): 12♂, 4♀. Quijotoa, Pima Co.; August 28, 1927: 1♀; [CU].

CALIFORNIA: Palm Springs, Riverside Co.; August 11, 1935; (P. H. Timberlake; on flowers of *Euphorbia polycarpa*) : 1♀; [PHT].

Moniaecera (Moniaecera) evansi Pate (Figs. 1, 5, 6.)

Moniaecera evansi Pate, Ent. News, LVII, p. 239, (1947); [♂; Arizona].

Type.—♂; banks of the Santa Cruz River, Tucson, Pima County, Arizona. Elevation, 2350 feet. August 2, 1946. (Howard E. Evans.) [Academy of Natural Sciences of Philadelphia, Type no. 10596.]

The curiously curved and uncinate plate borne by the eighth flagellar article of the males distinguishes this recently described species from all other forms of *Moniaecera.* In addition, the frontal facial basin of *evansi* is transversely strigose; the postocellar and ocellocular lines are subequal in length; the pronotum and humeri are rounded, edentate and ecarinate; and the mesosternum is concave and densely pilose.

The male genitalia and hypopygium indicate that *evansi* is closely related to *asperata,* though the parameres of the present species are much larger and more foliaceous than in the latter form. Moreover, the hypopygium is much more strongly expanded and spatulate on the apical portion while the basal petiole is very characteristically angulate mediolaterally on each side.

Distribution.—This species is still known only from the type series of males taken recently at Tucson, Arizona, in August.

Moniaecera (Moniaecera) abdominalis (Fox) (Figs. 2, 3.)

Crabro abdominalis Fox, Trans. Amer. Ent. Soc., XXII, p. 198, (1895); [♀; Texas].—Cockerell, Proc. Davenport Acad. Nat. Sci., VII, p. 148, (1898); [New Mexico: Mesilla Valley; Mesilla Park, Sept. 12, on *Isocoma wrightii* (i.e. *Aplopappus heterophyllus*)].—Cresson, Mem. Amer. Ent. Soc., no. 5, p. 52, (1928); [♀; Texas].

Rhopalum (*Crabro*) *abdominale* Hartman, Bull. Univ. Texas, no. 65, Sci. Ser. no. 6, p. 43, (1905); [♀, ♂; Texas: near Austin (biology)].

Rhopalum (*Moniaecera*) *abdominalis* Rohwer, Ent. News, XX, p. 323, (1909); [♀, ♂; Texas: Lee Co. (Birkmann)].

Euplilis abdominalis Pate, Mem. Amer. Ent. Soc., no. 9, p. 47, (1937).

Moniaecera abdominalis Ashmead, Canad. Ent., XXXI, p. 220, (1899).—Pate, Amer. Midl. Nat., XXXI, p. 353, (1944).

The present species bears a marked resemblance to the more westernly distributed *asperata,* from which it may be distinguished

by the simple flagellar apices, edentate fore coxae, and the rather sharply dentate to angulate pronotal humeri of the males, and in the females by the much deeper oral fossa and the flat non-callate post-temporal region of the head. In addition, the ocellocular-postocellar ratio of *abdominalis* is distinctly longer than that of *asperata*.

Type.—♀; Texas. (No other data.) [Academy of Natural Sciences of Philadelphia, Type no. 4698.]

FEMALE. Length 7 mm. Black; the propodeum with greenish reflections; the following eburneous: mandibles except red apices; scape broadly annulate at base and apex; fore femora narrowly annulate at apex; fore tibiae and tarsi entirely; middle and hind tibiae annulate at base; middle and hind metatarsi and tibial calcaria. Abdominal venter and third to sixth tergites ferruginous. Tegulae fulvous; axillary sclerites lacteous. Wings clear hyaline; veins very light fulvous, the longitudinal veins lacteous at base.

Head fulgid; inner orbits narrowly, and clypeus with dense appressed silvery sericeous pile; vertex and temples with sparse, short, decumbent subaureous hair. Front strongly concave between lower inner orbits but neither strigose nor punctate; medially just above antennal sockets with a large, slender, acuminate, declivent spine, flattened above; inner orbits at junction of upper and lower front swollen and subtorate; upper front with microscopically fine cancellate sculpture superposed on which are a few scattered, coarse punctures, and bisected by a fine impressed line from anterior ocellus; supra-orbital foveae linear; vertex coarsely and rather closely punctate, particularly posteriorly; ocelli situated in a low triangle, the ocellocular line almost seven-eighths (0.85) the postocellar distance. Temples with distinct, well-separated, moderate punctures. Occipital carina moderately flanged, efoveate, separated medioventrally from apex of subtrigonal oral fossa which is two-thirds as deep as wide anteriorly, the areas laterad of oral fossa flat, without tubercles or calli, and polite, impunctate. Antennae with scapes slender, subcylindrical, ecarinate, about two-thirds (0.676) the vertical eye length; pedicel obterete; flagellum with all segments simple, unmodified; relative lengths: scape 23; pedicel 5; flagellar segment one 4, two 3, three 3, eight 3, nine 3, ten 6. Clypeus short, one-sixth the vertical eye length; median lobe bisected by a weak keel, the apical margin arcuate. Mandibles as customary for genus; lower margins beneath at base with a large distinct tooth.

Thorax subfulgid; dorsum with a fine inconspicuous vestiture of short, suberect aeneous hair; pleura more noticeably clad with decumbent silvery pubescence. Pronotum strongly, closely punctate; dorsum notched medially; anterior margin rounded, ecarinate except at humeri which are dentate. Mesonotum closely, evenly and distinctly punctate throughout; suture between mesonotum and scutellum very deeply impressed but efoveate; scutellum flat, with microscopic cancellate sculpture and scattered somewhat coarse

punctures, laterally more or less marginate; postscutellum flat, closely, rather finely punctate; lateral edges marginate. Mesopleura rather finely and closely punctate throughout; prepectus sharply margined anteriorly; episternal suture oblique, impressed. Propodeum glabrous; dorsal face with anterior margin coarsely foveolate, medially with a cup-shaped marginate area, followed by a polite, transverse zone of radiating carinules; posterior and lateral faces subopaque, very finely granulate, the posterior face bisected by a large and deep obpyriform depression; lateral carina absent.

Legs simple, normal for genus. Middle and hind tibiae strongly spinose on outer faces. Hind tibiae with longer calcar seven-ninths the length of hind metatarsi which are three-fourths the combined length of four distal segments.

Fore wings with marginal cell three times as long as wide and broadly, squarely truncate at apex; radius with first and second abscissae subequal, third abscissa (truncation) about three-eighths (0.38) the length of second; transverse cubital vein straight, oblique, inclivous, one third the length of second abscissa of cubitus; first abscissa of cubitus seven-ninths (0.77) the length of second.

Abdomen subfulgid, subglabrous; impunctate. Tergites with microscopically fine, transverse aciculation. Ultimate tergite with a broad, flat trigonal pygidial area, the disc perfulgid, with scattered coarse punctures.

Allodigm.—♂; Fedor, Lee County, Texas. June 7, 1903. (Birkmann.) [United States National Museum.]

Male. Length 5 mm. Agrees with the type (female) except as follows: Livery similar but antennal flagellum entirely stramineous; abdomen wholly black, with purplish and greenish reflections.

Head with supra-orbital foveae not apparent; ocellocular line about seven-eighths (0.88) the postocellar distance. Oral fossa with median depth three-fourths the anterior width. Antennae with scapes cylindrical, not flattened, about five-ninths (0.57) the vertical eye length; pedicel obterete, not angulate below; flagellum with all segments simple, unmodified; relative lengths: scape 17; pedicel 4; flagellar segment one 3, two 2.5, three 2.5, nine 2.5, ten 2.5, eleven 4.5. Clypeus short, one-fifth the vertical eye length. Mandibles edentate beneath at base.

Legs simple. Fore coxae edentate anteriorly. Middle and hind tibiae weakly spinose on outer faces. All metatarsi simple, slender, elongate. Longer hind tibial calcar two-thirds length of hind metatarsi which are about seven-eighths (0.88) the length of four distal segments combined.

Fore wings with marginal cell three times as long as wide; radius with first abscissa about four-fifths (0.81) the length of second, the third abscissa one-half length of second; transverse cubital vein one-third length of second abscissa of cubitus; first cubital abscissa about two thirds (0.64) length of second.

Abdomen subfulgid, subglabrous; generally impunctate. Tergites with a very fine microscopic cancellate sculpture, the last two with scattered, coarse punctures; the pygidium perfulgid. Hypopygium and genitalia as figured.

Distribution.—This species ranges throughout the Gulf Coastal Plain from southern Georgia to eastern Texas as far west as the ninety-eighth parallel. Unlike the other species of *Moniaecera,* all of which seem to be pronounced xerophiles, *abdominalis* has apparently adapted itself to humid mesophytic conditions. From the dates when *abdominalis* has been taken, the species presumably has at least two generations a year.

In addition to the localities recorded below, Hartman found *abdominalis* nesting in relative abundance during August and September in sandy woods five miles southeast of Austin, Texas.

Specimens examined: 11; 7 females, 4 males, as follows:

GEORGIA: Thomasville, Thomas Co.; May 12, 1915: 1♀.

TEXAS: Lamar Co.; August 2, 1941; (R. W. Strandtmann): 1♂; [RWS]. Mineola, Wood Co.; July 19, 1906; (F. C. Bishopp): 1♂; [USNM]. College Station, Brazos Co.; June 10, 1937; (R. W. Strandtmann): 1♀; [RWS]. Fedor, Lee Co.; June 7, 1903; (Birkmann): 1♂, 1♀; [USNM]. "Tex[as]," (no other data): 1♀; [*type,* ANSP]. Sand dunes on Galveston Island, Galveston Co.; July 25, 1938; (R. W. Strandtmann): 1♀; [RWS]. Cuero, Dewitt Co.; June 19: 1♀; [USNM]. Corpus Christi, Nueces Co.; October 16, 1908; (Mitchell & Bishopp): 1♀; [USNM]. Brownsville, Cameron Co.; October 16, 1908; (Mitchell & Bishopp): 1♂; [USNM].

Huavea[4] new subgenus

The unusual structure of the mesopleura, the transversely carinate mesosternum, and the polite, perfulgid habitus readily differentiate *Huavea* from the nominate complex of *Moniaecera.*

Subgeneric Characters.—Polite, fulgid forms with the head, mesonotum and mesopleura relatively finely punctate. Head with the upper front not bisected by a furrow running forward from anterior ocellus to facial basin. Ocelli arranged in a higher triangle (3.0:2.5) than in *Moniaecera* s. s.; ocellocular line one and a half times the postocellar distance.

Mesopleura with well-developed foveolate hypersternauli and a posterior epicnemium defined by a sharp carina descending vertically from the mesopleural pit to the precoxal carina before the middle coxae. Mesosternum sharply and transversely carinate anteriorly. Propodeum with lateral carinae sharp, distinct, and well-developed above and below.

Abdomen with first sternite distinctly shorter than corresponding tergite, and either truncate or abruptly inflexed apically. Last tergite quadrangular in cross section, longer than broad, and with a large, impressed subquadrate area discally. Hypopygium flat, semicircular.

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[4] After the Huave Indians who formerly inhabited the western coastal region of the Isthmus of Tehuantepec, Oaxaca, Mexico.

GENOTYPE: *Moniaecera* (*Huavea*) *chontale* new species.

The subgenus *Huavea* comprehends at present only the following species from southern Mexico.

Moniaecera (Huavea) chontale[5] new species

The polite, dark cyaneous head and thorax, the unusual structure of the mesopleura and male pygidium, and the costulate upper frontal region distinguish *chontale* from all other known forms of *Moniaecera*.

Type.—♂; Salina Cruz, Oaxaca, Mexico. December 7.[6] (Frederick Knab.) [United States National Museum.]

MALE. Length 6 mm. Head and thorax polite, perfulgid, very dark cyaneous; legs and abdomen very dark brunneous. The following eburneous: scapes anteriorly; mandibles except red apices; fore tibiae on outer faces; middle and hind tibiae narrowly annulate at base; all tarsi. Dark brunneous: tegulae and axillary sclerites; antennal scapes and pedicels. Last abdominal segment castaneous. Wings clear hyaline; veins and stigma light brunneous.

Head perfulgid; clypeus, and inner orbits narrowly, with appressed, silvery sericeous pile; vertex with a thin vestiture of suberect, short, dark hair; temples more noticeably clad with decumbent light pubescence. Front between inner orbits glabrous, polite, impunctate; not bisected above by a deep furrow; upper front and vertex to ocellocular line coarsely, longitudinally costulate, with scattered, rather coarse punctures posteriorly. Ocelli arranged in an equilateral triangle which is bisected to behind postocellar line by a fine furrow; postocellar line two-thirds the ocellocular distance. Occipital carina moderate, not appreciably flanged, separated below, not tangent to, apex of oral fossa. Antennae with scapes cylindrical, ecarinate, five-ninths the vertical eye length; pedicel obterete; flagellum with all segments simple, unmodified; relative lengths: scape 21; pedicel 5; flagellar segment one 5, two 4, three 4, ten 4, eleven 6. A small compressed, laminate, disc-shaped process between and above antennal sockets. Clypeus short, flat, median length one-sixth the vertical eye length. Mandibles as customary in genus; lower margins entire and edentate beneath at base.

Thorax perfulgid; with a moderate vestiture which is dark and suberect on dorsum, and silvery and decumbent on pleura. Pronotum distinctly, closely punctate; strongly notched medially, anterior dorsal margin rounded, posterior margin strongly impressed; humeri strongly, acutely dentate, and with a carinule descending vertically from the tooth and another passing backward to the tubercles. Mesonotum closely and evenly striatopunctate; suture between mesonotum and scutellum very strongly impressed; scutellum strongly

[5] After the Chontale Indians of southern Mexico.

[6] Or July 12. The label merely bears the notation "12.7" in arabic numerals, and I have been unable to discover when Knab was at Salina Cruz.

tumid, punctate like mesonotum, the anterior margin foveolate; postscutellum barely punctate. Mesopleura finely acupunctate; prepectus very strongly margined anteriorly; episternal suture arcuate, deeply impressed, strongly foveolate; hypersternauli strongly foveolate; a vertical carina before each middle coxa and continued upward to mesopleural pit. Metapleura glabrous, polite, impunctate. Mesosternum transversely margined anteriorly. Propodeum subglabrous, fulgid; dorsal face margined anteriorly by a row of areoles, the remainder feebly areolate; posterior face bisected by a deep impression on each side of which it is polite then finely rugulose in neighbourhood of well-developed lateral carinae which are simple below; lateral faces subpolite.

Legs simple, normal for genus. Fore coxae edentate anteriorly. All tibiae slender, obterete, not spinose, the middle and hind pair shorter than the slender elongate, simple tarsi; fore tarsi simple. Longer calcar of hind tibiae three-fifths the length of hind metatarsi which are four-fifths the length of the combined four distal segments.

Fore wings short, not surpassing apex of third abdominal tergite; marginal cell three and a half times as long as wide and broadly, squarely truncate at apex; radius with first abscissa six-tenths the length of second, third abscissa (truncation) about one-fourth (0.277) the length of second abscissa; transverse cubital vein oblique, inclivous, two-fifths the length of second abscissa of cubitus which is one and a quarter the length of first cubital abscissa.

Abdomen fulgid; subglabrous; impunctate but with a microscopically fine, transverse aciculation. First segment slender, petioliform but not appreciably nodose at apex; remainder of abdomen gradually ampliate to clavate apex. Last tergite longer than wide, subquadrate in cross section, polite, discally with a large, impressed subquadrate area set off laterally by low ridges, apex truncate. Hypopygium flat, semicircular.

Female. Unknown.

This distinctive Mexican species is known only from the unique male taken on the west coast of the Isthmus of Tehuantepec.

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TWO NEW SPECIES OF LAMPYRIDAE FROM SOUTHERN FLORIDA, WITH A GENERIC REVISION OF THE NEARCTIC FAUNA

(COLEOPTERA)

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(Text-figures)

Descriptions are herewith presented of two remarkable species of *Lampyridae* collected in southern Florida, each apparently requiring the erection of a new genus. The position of one of these, *Pleotomodes,* in the current taxonomic scheme fails entirely to express its phylogenetic relationship. Certain changes in classification are therefore proposed in a review of the American genera occurring north of Mexico. The generic names used are as they are now recognized, and no nomenclatorial investigation has been attempted.

In subsequent references the abdominal sternites are numbered consecutively beginning at the base with number 2, the first segment of the abdomen having no visible sternite. The hypomera, or inflexed sides of the prothorax, are described as being open anteriorly when their anterior margin, forming the postero-lateral margin of the head cavity, becomes obsolete without attaining the lateral margin of the thorax. Conversely, they are closed when the anterior margin does attain the lateral margin. Similarly, the epipleura are described as being either completely or incompletely defined basally, depending on whether the acute lateral margin of the elytra does or does not attain the base.

The author is indebted to Dr. E. A. Chapin and Mr. H. S. Barber, of the U. S. National Museum, for the loan of the holotype and paratype of *Micronaspis floridana,* and especially to Mr. Barber for his invaluable suggestions and advice; to Dr. Frank N.

Young, of the University of Florida, for the loan of the allotype of the same species; to Dr. Henry Dietrich, of Cornell University, for the opportunity to describe *Pleotomodes needhami;* to Mr. A. T. McClay for the loan of specimens of the very rare *Ginglymocladus;* and to Mr. R. R. Dreisbach for a specimen of the genus *Luciola* collected in Texas by Dr. Ernest Booth.

MICRONASPIS new genus

Body elongate oval with subparallel sides. Head deeply inserted in the thorax, broadly but not deeply concave above between the eyes in the male; eyes very large, well separated above and beneath; mandibles small, rapidly narrowed and very slender apically, the tips recurved; clypeus mobile, basal articulation membraneous but this not apparent when retracted, membraneous labrum prominent; maxillary palpi massive, of the usual lampyrid structure; terminal joint of labial palpi broadly crescentic, the apex truncate; gula very short, transverse, the sutures obliterated; antennae short and slender, subfiliform, somewhat compressed, 11-jointed, without minute terminal appendix, posteriorly flexile at the first joint, clothed with rather coarse and somewhat bristling pubescence. Pronotum semi-elliptic, broadly rounded in front, without median carina and without transparent spots above the eyes, sides broadly explanate, front less broadly; prosternum well developed, its anterior margin with a distinct emargination in about median third; hypomera widely open anteriorly. Elytra with moderately wide explanate sides; pubescence rather long; epipleura as in *Ellychnia,* strongly inflexed, completely defined basally, moderately wide, gradually narrowing to apex. Abdominal spiracles dorsal; tergites not expanded at the sides beyond the sternites; luminous organs of male occupying all of sternites 6 and 7, of female a large part of sternite 6; sternite 9 of male exposed. Legs short and stout, as in *Aspisoma,* compressed; claws simple in the female, in part dissimilar in the male.

GENOTYPE: *Micronaspis floridana* new species.

Micronaspis is related to *Aspisoma* and *Cratomorphus,* but in habitus it more nearly resembles *Photinus.* It differs from *Aspisoma* in its subparallel form, comparatively narrow epipleura, emarginate prosternum, and in the rather long and suberect elytral pubescence. The epipleura in *Aspisoma* are very wide and rapidly narrowed from base to apex, with the elytra widest near base and converging apically. In *Cratomorphus* the body is subparallel, somewhat as in *Micronaspis,* but the eyes are extremely large in the male with the head deeply concave between them, the antennae are approximate, the pronotum is provided with two semi-transparent anterior spots, and abdominal tergites 6 and 7 are expanded laterally beyond their sternites.

Micronaspis floridana new species (Text-figs. 1 to 3.)

Head dark piceous brown, fulvo-testaceous between and in front of antennae, the palpi a little darker; antennae piceous, two basal joints paler. Pronotum flavo-testaceous with vitreous luster, an inverted irregular T-shaped discal dark spot extending from near the base half way to apex. Scutellum and mesonotum dark piceous, paler at the sides. Elytra dark piceous brown; sutural borders narrowly pale, the pale area attaining the scutellum but not enveloping it and not quite reaching the apex; lateral borders rather broadly pale, the pale area extending from base three-fourths or more toward apex; pale colors of elytra not sharply limited. Head beneath dark, gula and mouth parts pale; prosternum pale; balance of ventral surface, except apical sternites, piceous brown; legs piceous brown, the tarsi darker. Length 9–10 mm.

MALE.—Eyes very large, converging anteriorly, separated medially above by about two-thirds of their length, beneath by about one-half of their length. Head broadly but not deeply concave between the eyes, flat between the antennal cavities which are separated by nearly the width of the first antennal joint; surface smooth and shining, sparsely and finely punctulate; clypeus short, twice as wide as long, with larger setigerous punctures, apex not emarginate. Antennae about one-third as long as the body, second joint short but not transverse, joints 3, 4, and 5 widest, thence gradually tapering to apex, median joints about twice as long as wide.

Pronotum evenly semi-elliptic, one-third wider than long; hind angles subrectangular, narrowly rounded, not produced posteriorly; base feebly emarginate in a broad circular arc; explanate lateral borders not reflexed; marginal bead excessively fine, lacking at hind angles; surface smooth and shining, finely and rather sparsely punctulate throughout, each puncture bearing a suberect flavate hair, coarse non-setigerous punctures irregularly and sparsely distributed in a marginal band and along anterior half of median line. Scutellum finely punctulate. Prosternum with rather long pale pubescence directed forward; emarginate in front, the notch variable, in the type it is arcuate, occupies more than median third, is three times as wide as deep, and is abruptly limited each side by a prominent angulation of the front margin.

Elytra nearly three times as long as the pronotum, conjointly one and three-fourths times as long as wide, widest at middle where they are one-fourth wider than the pronotum; lateral margins evenly arcuate throughout; surface finely, not densely punctulate, the punctures not in the least impressed, annulate, each bearing a moderately long suberect flavate hair; a denser secondary system of excessively minute punctules evenly distributed but lacking basally and at apex, these not perceptibly setigerous; surface rugulosity very fine and shallow; discal costae indistinct.

Abdominal sternites 2, 3, 4, and 5 piceous brown; sternites 6 and 7 pale, wholly occupied by the luminous organs, their apical margins broadly, feebly, and angularly emarginate; sternite 8 dark medially, sides pale, its

apex scarcely emarginate and with a short subtriangular median process; sternite 9 elongate, brown. Apical angles of tergites 6 and 7 acute and slightly produced posteriorly, visible from below; apex of pygidium subtruncate and feebly bisinuate, the apical angles narrowly rounded. Tibial spurs very small, almost indistinguishable from the apical setae, apparently lacking on protibiae; anterior claw of front and middle tarsi with a short acute tooth arising basally and extending parallel to the tip, other claws simple.

FEMALE.—Differs from the male in having the head flat between the eyes; eyes smaller, separated medially above by about five-sixths of their length; abdomen with seven visible sternites, luminous organs occupying all of sternite 6 except narrow basal and wider lateral borders; sternite 8 subtriangular, nearly isosceles, the apex with a small triangular notch; pygidium similar to sternite 8, its apex truncate with the apical angles narrowly rounded; claws simple.

The prosternal emargination of the female allotype is deep and triangular with the limiting angles broadly rounded. In this specimen the prosternum is more compressed longitudinally than is the case with the male holotype. The apparent depth and shape of the emargination may therefore vary according to the position assumed by the prosternum. The prosternal emargination of the male paratype is shaped much as in the holotype except that it is angular instead of arcuate and the limiting angles are broadly rounded. In color both the allotype and paratype lack the pronotal spot, and a dilute brown replaces the dark piceous colors of the holotype, possibly due to immaturity. Both specimens are also of a perceptibly more elongate form than the holotype.

Holotype.—Male; Cedar Keys, Florida, July 12, 1939, collected by P. W. Owen; located in U. S. National Museum collection.

Allotype.—Female; Dade County, Miami, Florida, July 5, 1935, collected by Frank Young; located temporarily in author's collection.

Paratype.—Male; Key Largo, Florida, March 1898, C. L. Pollard and G. N. Collins collectors. Also labelled, "Borrowed July 1911 by Ern. Olivier but not determined." Located in U. S. N. M. collection.

PLEOTOMODES new genus

Antennae of male simple, 11-jointed, short and stout, compressed, with rather coarse and somewhat bristling pubescence, without minute terminal appendix. Structures otherwise very similar to *Pleotomus*.

MALE.—Body elongate oval; integuments feebly shining, sparsely subgranulate beneath, each granule bearing a short decumbent hair; vestiture of upper surface similar, more erect, recurved, each hair arising from a

minute granuliform base on the interstices of the nude punctures. Head deeply inserted and fully covered by the pronotum; eyes very large, approximate beneath; mouth parts much reduced, nearly as in *Pleotomus,* the clypeus differing by being subcircular in outline and extending nearly to tips of closed mandibles, membraneous labrum inconspicuous; mandibles less prominent and smaller than in *Pleotomus,* abruptly narrowed and very slender apically; maxillary palpi as in *Pleotomus,* stout and compact, first three joints together obconic, fourth subtriangular, widest at base, compressed apically; terminal joint of labial palpi rather broadly scalene triangular. Pronotum semi-elliptic, sides and front widely explanate, hypomera open anteriorly. Epipleura completely defined basally, rather narrow, gradually narrowing from the base, inner margin not sinuate. Abdomen with seven visible sternites, genitalia exposed; tergites 5, 6, and 7 expanded laterally and partly visible from below, their posterior angles acutely produced far beyond apices of corresponding sternites, hind angles of pygidium much less produced, the apex truncate between them. Abdominal spiracles visible from below, located ventrally close to side margins of sternites 2, 3, 4, 5, 6, and 7. Luminous organs not apparent. Legs as in *Pleotomus,* short and stout, apices of tibiae unmodified, each with two very small slender acute spurs; fourth tarsal joint bilobed, fifth extending for one-half its length beyond lobes of fourth; claws simple.

Female unknown, probably apterous.

GENOTYPE: *Pleotomodes needhami* new species.

Pleotomodes needhami new species (Text-figs. 4 to 6.)

MALE.—Antennae fuscous, paler basally. Pronotum pale testaceous yellow, with a poorly defined central piceous cloud which is darker basally each side. Scutellum and mesonotum pale. Elytra brownish piceous, with narrow and entire sutural, apical, and lateral pale borders, the sutural extending indistinctly around scutellum, the lateral wider. Ventral surface pale testaceous yellow; legs pale, tarsi darker. Length 6.75–7.25 mm.

Antennae approximate, compressed, as long as the pronotum, widest at fourth and fifth joints, thence tapering to apex, second joint very short and strongly transverse, third to ninth subtriangular, about as long as wide, not serrate, tenth and eleventh joints somewhat elongate, the latter oval. Clypeus granulate punctate. Mandibles pubescent externally.

Pronotum strongly convex medially, one-sixth wider than long, apex rather narrowly rounded, lateral margins parallel, hind angles nearly rectangular and feebly prominent posteriorly; surface with moderately coarse and densely crowded shallow circular nude punctures; vestiture sparse, consisting of rather coarse short recurved hairs arising from minute granules on the interstices of the punctures, basal part of median convexity coarsely granulate and without punctures, a smooth median line here briefly indicated, anterior explanate border with an irregular smooth vitreous spot each side. Scutellum punctate and pubescent like pronotum, punctures not dense.

Elytra over two and one-half times as long as pronotum, conjointly twice as long as wide, widest at middle where they are one-sixth wider than pronotum; surface densely and shallowly but not coarsely punctate, the punctures irregularly formed by the surface rugulosity, more distinctly punctate basally, all punctures nude; vestiture not dense, similar to that of pronotum but more erect, secondary pubescence of excessively minute fine hairs evenly distributed throughout; sides of elytra vertically declivous at the humeri, thence narrowly explanate, not reflexed; disk vaguely tricostate, the inner costa on basal third, median costa oblique, on basal two-thirds, outer costa faintly indicated medially; wide basal part of epipleura smooth, concave, with scattered simple punctures, punctures denser on narrow part and granulose apically, secondary pubescence evident.

Ventral surface of abdomen and metasternal side pieces with secondary pubescence.

Type.—Male; Archbold Biological Station, Lake Placid, Florida, April 17, 1945, collected at light by J. G. Needham; located in Cornell University collection.

Paratype.—Male; same data except date, April 26, 1947. In author's collection.

This extremely interesting addition to our fauna is named in honor of its discoverer, Dr. Needham. Although unlike anything heretofore described, it is obviously closely related to *Pleotomus*. Olivier's synoptic tables in the Genera Insectorum [1] would assign to *Pleotomodes* a totally untenable position in the *Lucidotinae*, far removed from *Pleotomus*.

Generic Revision of the Nearctic Lampyridae

Olivier divided those *Lampyridae* having the head completely covered by the pronotum into five subfamilies, based exclusively on antennal structure. The distinctions are sometimes not subject to precise interpretation, and, as is well known, do not always indicate the natural affinities of the genera involved. Perhaps the most unsound feature of this system is the assignment to the *Lamprocerinae* of all those species having the antennae pectinate with branches not broadly expanding at base. In this group Olivier places *Pleotomus* and *Polyclasis*, and other unrelated genera. It is apparent that a different approach to the problems of lampyrid taxonomy is required, and the following review of the genera occurring north of Mexico is offered as a contribution toward that end.

[1] Genera Insectorum, fasc. 53, Lampyridae, 1907.

Lampyridae—Key to Subfamilies

1. Third and fourth tarsal joints lobed beneath; third antennal joint short, similar to second; mentum large and flat, strongly sclerotized, transversely quadrate.....MATHETEINAE
   Fourth tarsal joint only lobed beneath; third antennal joint elongate, similar to fourth, except in *Brachylampis blaisdelli* Van D.; mentum small and more or less convex, semi-membraneous or feebly sclerotized, elongate trapezoidal.....2
2. Head more or less horizontal when retracted, the front extending anteriorly in advance of the eyes; gula well developed and sclerotized. Antennae usually ramose.....AMYDETINAE
   Head vertical when retracted, the front scarcely more prominent than the eyes; gula semi-membraneous, often greatly abbreviated.....3
3. Pronotum roughly semi-elliptic, anterior angles completely obliterated, posterior angles well defined and subrectangular; lateral and anterior borders broadly explanate; hypomera open anteriorly.....4
   Pronotum not as above, transverse, with more or less evident anterior angles; borders not broadly explanate; hypomera closed anteriorly. Eyes very large, antennae simple.
   (occurrence in American fauna doubtful) LUCIOLINAE
4. Clypeus connate with the front, strongly sclerotized throughout and prominent anteriorly, membraneous labrum arising from its ventral surface; epipleura incompletely defined basally; gula less abbreviated, longitudinal; legs usually long, slender, and not compressed....PHOTURINAE
   Clypeus not strongly sclerotized throughout, partially membraneous apically where it merges with the membraneous labrum, usually with a membraneous basal articulation; epipleura completely defined basally; gula greatly abbreviated, usually transverse; legs usually short, stout, and compressed.....LAMPYRINAE

SUBFAMILY LAMPYRINAE

As here emended, this subfamily will include Olivier's *Lamprocerinae, Lucidotinae, Photininae,* and *Lampyrinae.* No representative of his *Dadophorinae* was available for study. It is proposed to combine the first three of these divisions into a single tribe, the *Photinini;* the fourth is retained intact and likewise assigned tribal rank. In the following table the proposed sequence of genera is indicated by the numbers in parenthesis.

Subfamily Lampyrinae—Key to Tribes, Subtribes and Genera

1. Antennae without minute terminal appendix.....Tribe PHOTININI 2
   Antennae with minute terminal appendix, female apterous.
   Tribe LAMPYRINI 12
2. Abdominal spiracles dorsal, not visible from below.....3
   Abdominal spiracles ventral, visible from below.....4
3. Mandibles regularly narrowed to apex, excluding the internal basal enlargement; luminous organs of female, when present, median.
   Subtribe PHOTINI 5
   Mandibles abruptly narrowed and very slender apically; luminous organs of female lateral, sometimes confluent.....Subtribe CRATOMORPHI 8
4. Eyes small, distant above and beneath; mandibles normal.
   Subtribe LAMPROCERAE 10
   Eyes of male very large, approximate beneath; female apterous; mandibles abruptly very slender apically, or otherwise modified.
   Subtribe PLEOTOMI 11
5. Antennae strongly compressed, differing notably in the sexes, being distinctly longer in the male and more than half as long as the body. Both sexes alate and non-luminous; body texture soft; eyes small and distant; pronotum narrowly rounded in front; epipleura narrow.
   (1) **Lucidota** Laporte
   Antennae not strongly compressed, slender, similar in the sexes, not or scarcely half as long as the body.....6
6. Epipleura moderately wide and well defined, body texture firm. Both sexes alate and non-luminous, eyes small and distant, median lobe of aedeagus with sclerotized ventro-basal processes.
   (4) **Ellychnia** Leconte
   Epipleura narrow, body texture soft.....7
7. Antennae with short fine appressed pubescence, insertion of joints slightly eccentric, producing a feebly subserrate outline on the inner side; clypeus connate with the front; both sexes alate and non-luminous; eyes small and distant; prosternum arcuately emarginate in front.
   (2) **Pyropyga** Motschulsky
   Antennae with rather long coarse and somewhat bristling pubescence, insertion of joints median; clypeus not connate, the articulation membraneous; males alate and usually luminous, females usually similar, sometimes brachypterous; eyes usually large; prosternum truncate in front.....(3) **Photinus** Laporte
8. Body broadly oval, sides of elytra converging from near base to apex; epipleura extremely wide, subtriangular, rapidly narrowing to apex.
   (7) **Aspisoma** Laporte
   Body elongate oval, sides subparallel; epipleura moderately wide, gradually narrowing to apex.....9
9. Prosternum truncate in front, or broadly and feebly emarginate throughout its width; pronotum narrowly rounded anteriorly, disk in part

alutaceous and with a more or less distinct median carina; clypeus connate with the front.....(5) **Pyractomena** Leconte

Prosternum distinctly emarginate medially; pronotum broadly rounded anteriorly, disk smooth and shining, without median carina; clypeus not connate.....(6) **Micronaspis** new genus

10. Body broadly oval, epipleura very wide; antennae compressed; both sexes alate and non-luminous, eyes small; male abdominal sternite 9 not exposed.....(8) **Tenaspis** Leconte

11. Antennae of male bipectinate, of 13 or 14 joints.
(9) **Pleotomus** Leconte

Antennae of male simple, of 11 joints....(10) **Pleotomodes** new genus

12. Antennae of male with less than 11 joints, excluding the minute terminal appendix; abdominal spiracles ventral.....(11) **Microphotus** Leconte

Antennae of male 11-jointed; abdominal spiracles dorsal. Pronotum with two anterior semi-transparent spots.....(12) **Phausis** Leconte

Olivier's separation of the *Lucidotinae* and *Photininae* as two groups of equal rank has been abandoned as an entirely artificial division that cannot be maintained on any basis not subject to numerous exceptions and uncertainties. Of the species assigned to *Pyropyga* by Leconte, *luteicollis* is removed to *Lucidota, simplex* to *Ellychnia,* and *indicta* to *Photinus.* The remaining species of *Pyropyga* form a homogeneous unit, confirmed by genitalic characters, that is fully entitled to generic rank. *Ellychnia* likewise is adequately defined by genitalic structure, and also by the comparatively wide epipleura and firm body texture. *Lucidota,* however, is a complex of numerous generic types that have never been properly tabulated, and, until this has been done, the correct generic designations for *atra, punctata,* and *luteicollis* cannot be determined.

The subtribes *Cratomorphi* and *Pleotomi* are here originally proposed. They are well-defined groups whose removal reduces the other subtribes to a more acceptable state of uniformity. A third genus of the *Pleotomi* is represented in the Cornell University collection by an Algerian species having short and nearly filiform antennae, very much as in some of our species of *Pyractomena.* It is especially noteworthy in having the tibiae unguiculate, a modification not observed elsewhere in the *Lampyridae.*

It is probable that still other subtribes will be required for the accommodation of some of the South American components of Olivier's *Lamprocerinae. Tenaspis* is without any doubt a mem-

ber of the small group of genera allied to *Lamprocera*. It will contain species with either simple or pectinate antennae, and is an excellent example of the absurdity of dividing the family primarily on antennal structure.

Microphotus, referred to the *Lampyrini* because of the minute antennal appendix, is structurally very close to the *Pleotomi*, possessing the same subgranulate integuments with similar vestiture, very large eyes and reduced mouth parts, similar abdominal structure with ventro-lateral spiracles, and similar genitalia. A question therefore arises concerning the value of the antennal appendix in defining a natural group. It may be noted that Leconte placed *Pleotomus* with *Microphotus* in his group *Lampyres*, although for no very logical reason.

The two anterior thoracic spiracles in the *Lampyrinae* are located each at the outer extremity of a transverse subtubulate base partly overlapping the mesepisterna and closely approximating a similar condition obtaining in many *Lycidae*.

Subfamilies Photurinae and Luciolinae

Our representatives of the *Photurinae* are all referable to the genus *Photuris* Leconte.

The *Luciolinae* are the predominant lampyrids of the Asiatic and Pacific faunas, extending partly into eastern Europe; and no representative has heretofore been recorded from the American continents. The subfamily is included in the present discussion on the basis of a single specimen collected at Uvalde, Texas. This specimen, a male, differs from all the described species in having seven instead of six visible abdominal sternites, apparently not differing in any other important respect from typical members of the genus *Luciola*. It seems highly improbable that it is an established American species and its description as such would be premature without additional confirming specimens.

Subfamily Amydetinae

The three genera provisionally placed in this subfamily have in common only their exclusion from the other four subfamilies herein defined. *Brachylampis* appears to bear a close relationship to the East Indian *Ototreta*, a genus assigned rather unsatisfactorily to the Luciolinae. Our genera may be distinguished as follows.

1. Gular sutures without deep anterior fossae; hypomera narrowly open anteriorly; epipleura inflexed and completely defined basally; antennae bipectinate, the branches longer in the male and arising basally from segments 3 to 10, broadly continuous internally with the segment; coarse pronotal punctures nude.....**Polyclasis** Newman

   Gular sutures each with a deep anterior fossa; epipleura narrow, not inflexed, incompletely defined basally; pronotal punctures setigerous...2

2. Male—Antennae simple, short and stout; maxillary palpi of the usual form, short, stout, broader apically; hypomera narrowly open anteriorly; ninth abdominal segment retracted.....**Brachylampis** Van Dyke

   Male—Antennae long and slender, segments 3 to 10 each with a long compressed branch arising basally and broadly continuous internally with the segment; maxillary palpi comparatively slender and elongate, the terminal joint scarcely enlarged; hypomera closed anteriorly; ninth abdominal sternite and tergite exposed. Head only partly covered by pronotum.....**Pterotus** Leconte

Subfamily Matheteinae

Matheteus and *Ginglymocladus* differ so fundamentally from all other *Lampyridae* that their segregation as one of the primary divisions of the family seems imperative. In addition to the peculiarities already noted, the terminal palpal joints are smooth, shining, and glabrous apically. The two genera are characterized as follows.

Form broadly oval; epipleura very wide, completely defined basally, the cariniform inner margin obsolete at basal third; head without smooth frontal impressions; mandibles not dentate; antennae pectinate, the branches longer in the male and arising submedially from segments 4 to 10, broadly continuous internally with the segment.....**Matheteus** Leconte

Form narrowly oval; epipleura narrow, incompletely defined basally, the outer margin turning inward and joining the inner margin well before the base; head with smooth frontal impressions; mandibles unidentate; antennae pectinate with branches arising submedially from segments 4 to 10, each branch narrowing to base and inserted in a recessed semi-membraneous articulation allowing independent motion.

(Figs. 7 to 11) **Ginglymocladus** Van Dyke

Explanation of Figures

Fig. 1.—*Micronaspis floridana* new species. Cedar Keys, Florida, VII–12–39, P. W. Owen. Fig. 2.—Same, anterior protarsal claw of male. Fig. 3.—Same, male genitalia, (a) dorsal, (b) lateral, (c) ventral. Fig. 4.—*Pleotomodes needhami* new species. Archbold Biological Station, Lake Placid, Florida, IV–17–45, J. G. Needham. Fig. 5.—Same, antenna. Fig. 6.—Same, male genitalia, (b) lateral, (c) ventral. Fig. 7.—*Ginglymocladus discoidea* Van Dyke. Atta, California, V–4, A. T. McClay. Fig. 8.—Same, antenna. Fig. 9.—Same, ventral view showing structure of epipleura and abdomen. Fig. 10.—Same, metatarsus. Fig. 11.—*Ginglymocladus luteicollis* Van Dyke, ventral view of head. Crescent City, California, V–3, A. T. McClay.

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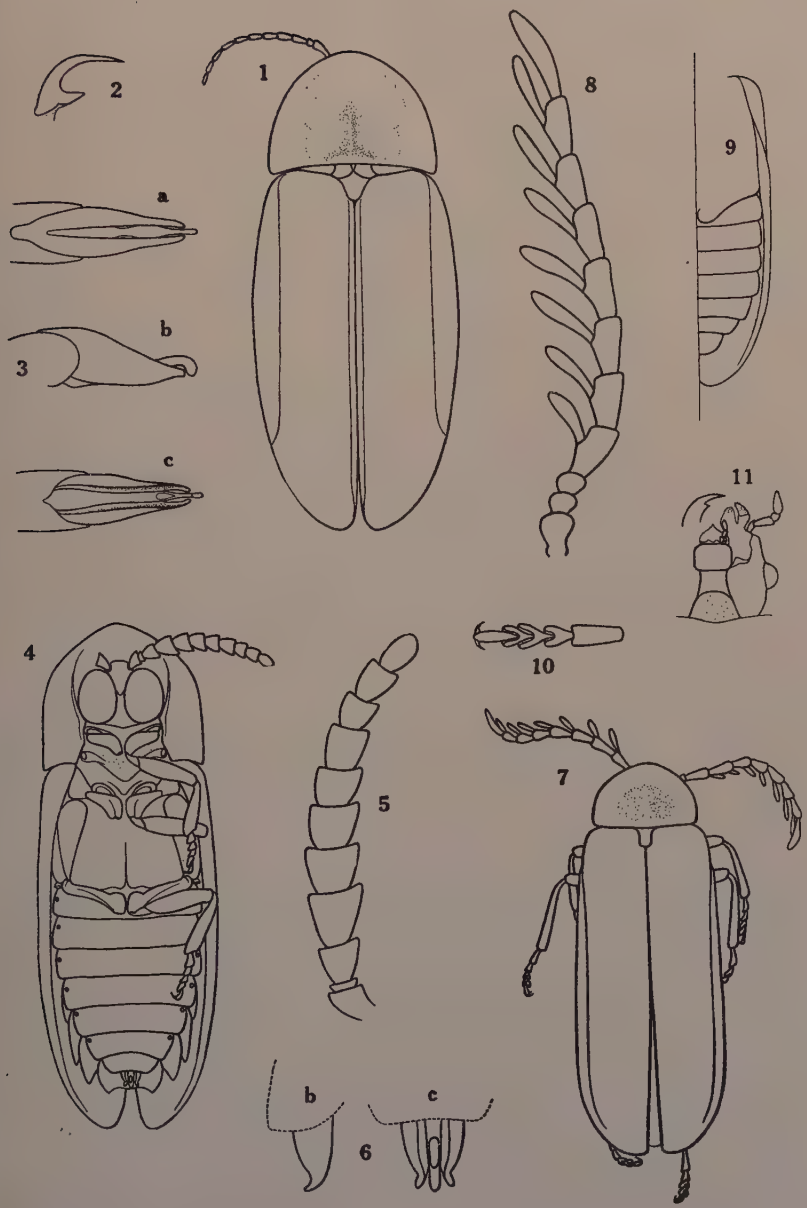
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NEW EASTERN AMERICAN SPECIES OF PODABRUS II

(COLEOPTERA: CANTHARIDAE)

BY JOHN WAGENER GREEN

Easton, Pennsylvania

(Text-figures)

The following descriptions and notes are a continuation of the first paper recently published under this title.[1] For the material on which they are based the author is indebted to Dr. Mont A. Cazier, of the American Museum of Natural History; Dr. E. A. Chapin and Mr. H. S. Barber, of the U. S. National Museum; Dr. Henry Dietrich, of Cornell University; Prof. W. C. Stehr, of Ohio University; Mr. O. L. Cartwright, Mr. Carl Cook, Mr. R. R. Dreisbach, and Mr. K. M. Fender.

Podabrus pygmaeus new species (Text-fig. 1.)

Head black posteriorly, testaceous yellow in front; extending back from the apical border of the clypeus is a piceous spot, darker in front, which usually covers most of the clypeus and may attain the antennal cavities; antennae black, first joint somewhat paler basally and beneath; mandibles brown with the base pale; palpi black. Pronotum testaceous yellow, median third of width black or brown, the dark area expanding over the basal callosities and nearly or quite attaining base and apex. Scutellum and mesonotum black. Elytra totally black. Head beneath black or brown posteriorly, pale in front, the maxillae dark; underside of prothorax pale, balance of ventral surface black. Legs, including coxae, piceous black, trochanters and tips of femora usually slightly paler; claws pale. Length 9–10 mm.

MALE.—Eyes large; head distinctly narrower than the pronotum, the black area rather finely and densely punctate, shining, not alutaceous except faintly near antennal cavities; epicranium beneath shining, sparsely punctate in front, more densely posteriorly and somewhat substrigose along gular sutures. Antennae slender, three-fifths as long as the body, densely clothed with short decumbent pubescence, second joint one-half as long as third, median joints about three times as long as wide.

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[1] Trans. Amer. Ent. Soc., 1947, LXXIII, p. 63.

Pronotum strongly transverse, three-fourths wider than long, widest near base, the lateral margins thence arcuately converging to the broadly rounded anterior angles; hind angles obtuse, indistinct, not dentiform; basal margin broadly arcuately emarginate in median half. Surface of pronotum shining, not alutaceous; explanate borders smooth and finely punctulate; disk finely roughened and irregularly punctate, the punctures not coarse, denser in the median dark area; sides broadly explanate and reflexed in a nearly uniform width throughout; basal callosities not prominent; median line impressed, abbreviated in front.

Elytra strongly inflated as in *tricostatus,* widest beyond the middle where they are conjointly three-fourths wider than the pronotum; surface very finely and densely rugulose, feebly shining, densely clothed with short decumbent fulvous pubescence, discal costae obliterated.

Abdomen dull, secondary pubescence dense throughout, lacking apically; sternite 7 not membraneous medially, sternite 8 broadly and shallowly arcuately emarginate at apex. Legs slender, the pubescence short, moderately dense and unmodified; protibiae and metacoxae not sexually modified; claws acutely toothed, the protarsal very narrowly cleft with the tooth slender and nearly as long as the apical part, other claws more widely cleft with the tooth a little shorter. Dorsal plate of aedeagus glabrous above, very sparsely pubescent beneath, the apex densely fringed with long hairs interrupted by the median notch.

Female unknown.

Type.—Male; Athens, Ohio, June 3, 1934, W. C. Stehr collector; located in author's collection.

Paratypes.—OHIO: Athens, May 29, 1934, W. C. Stehr, one male. KENTUCKY: Crailhope, April 30, 1946, Carl Cook, one male. Both paratypes are in the author's collection.

Pygmaeus is closely related to *tricostatus* and could readily be mistaken for an undersized example of that species. *Tricostatus* differs essentially in the male genitalia (fig. 2), and also in the costate elytra, longer second antennal joint of the male, and in the pale clypeus with only the apical border dark.

Podabrus dreisbachi Green

This species was described from a single male specimen.[2] A female is now at hand, collected by R. R. Dreisbach in Midland County, Michigan, June 16, 1947.

It differs from the male in its smaller eyes, the head not as wide as the pronotum, the dark spot between the eyes much reduced and nubilous; antennae shorter, little more than half as long as the body, median joints about

[2] Trans. Amer. Ent. Soc., 1947, LXXIII, p. 73.

three times as long as wide, color fuscous with the basal joints pale and the median joints piceous; abdominal sternite 8 produced medially in a short lobe which is deeply, broadly, and arcuately emarginate; protibiae unmodified; tarsal claws similar throughout, widely cleft, the tooth acute and shorter than the more slender apical part. The color of the elytra is darker piceous than in the male type, with the pale sutural area less distinctly defined, expanding at base but not quite attaining the lateral margins; scutellum and mesonotum black. This specimen, in the author's collection, is designated the allotype.

The female of *dreisbachi* rather closely resembles females of *modestus,* both having similarly colored elytra with pale borders, the sutural pale area broadly expanding at base. No other related species has this type of elytral coloration. *Dreisbachi* females may be readily distinguished from *modestus* females by the pale head with smaller eyes, more punctate pronotum, and the denser elytral vestiture.

Podabrus fissus Lec.

A female example of this very rare Florida species, originally in the Schaeffer collection, was generously loaned for study by Mr. K. M. Fender. In general appearance *fissus* seems most nearly related to *punctulatus*. The structure of the pronota of the two species is almost identical. The coarse and dense discal sculpture of the pronotum of *fissus,* as previously noted by Mr. C. A. Frost in an examination of the male type,[3] is exactly duplicated in the female specimen, and is without doubt a reliable diagnostic character for the species.

Podabrus fumiganus new species (Text-fig. 3.)

Head red, reddish yellow anteriorly, basal border black, a transverse arcuate piceous band between the eyes, the band may be much reduced or may nearly or quite cover the posterior half of the head; antennae black, base of first joint pale; maxillary palpi black, basal joint pale; labial palpi pale, terminal joint black. Pronotum red, apical border sometimes with a narrow indistinct transverse piceous band medially. Scutellum and mesonotum black. Elytra black, lateral margins with a very narrow pale testaceous border which fails to attain the apex and is wider basally. Underside of head and prothorax red, balance of ventral surface black. Legs and coxae black, trochanters and base of femora paler. Length 8–10.5 mm.

MALE.—Eyes large; head one-fourth wider than pronotum, coarsely and

[3] Trans. Amer. Ent. Soc., 1947, LXXIII, p. 72.

densely punctate behind antennal prominences, the punctate area somewhat dull and alutaceous; epicranium beneath irregularly and rather densely substrigose, punctures usually indistinct. Antennae slender, seven-tenths as long as the body, densely clothed with short pubescence which is erect externally except on first two joints, second joint one-half as long as third, median joints about three and one-half times as long as wide.

Pronotum one-fifth wider than long, widest near apical third, lateral margins thence strongly arcuately converging to the scarcely indicated apical angles, feebly converging to basal third, thence nearly parallel or slightly diverging to the rectangular hind angles which are not sharply marked nor dentiform; surface somewhat dull, coarsely and densely punctate except on explanate sides, the punctures slightly substrigose near the brief median impressed line which fails by far to attain either base or apex; basal callosities prominent; sides rather narrowly explanate, not reflexed except very feebly at the hind angles which are nearly flat.

Elytra finely and densely rugulose, smooth basally; pubescence cinereous, short and rather dense, decumbent, with somewhat longer suberect hairs intermixed.

Abdomen dull, secondary pubescence dense throughout, lacking apically; sternite 7 with apical border somewhat membraneous medially, sternite 8 broadly and shallowly arcuately emarginate at apex. Legs very slender, the pubescence short, rather dense, longer posteriorly on basal part of femora; protibiae and metacoxae not sexually modified; claws similar throughout, with a broad basal tooth the free angle of which is not produced. Dorsal plate of aedeagus with apical fringe of long hairs, beneath with a large area of dense erect pubescence each side.

FEMALE.—Differs from the male in having the eyes smaller and the head not wider than the pronotum; antennae three-fifths as long as the body, vestiture unmodified, second joint three-fifths as long as third; sternite 8 with a minute apical notch, rufous medially, the sides broadly black; legs more extensively pale basally, the pubescence unmodified, front and middle coxae pale.

Holotype.—Male; Newfound Gap, Great Smoky Mts. National Park, Tennessee-North Carolina, May 14, 1946, 5000 ft. alt., collected by H. Dietrich; located in Cornell University collection.

Allotype.—Female; Chimney Camp, Great Smoky Mts. National Park, Tennessee, May 14, 1946, 3000 ft. alt., collected by H. Dietrich; located in Cornell University collection.

Paratypes.—NORTH CAROLINA: Black Mts., May 14 to 28, six males and one female; Graybeard Mt., May 26 and June 9, two females. The paratypes were probably collected by Wm. Beutenmüller. Two of the paratypes are in the author's collection, the others in the collection of the American Museum of Natural History.

This species is nearest to *punctatus* and *limbellus,* differing in the distinctive male genitalia and in the narrow testaceous lateral border of the elytra. In *punctatus* the elytra are entirely black, in *limbellus* both lateral and sutural borders are pale. Two other species having similar claws and coarsely punctate pronota, *scaber* and *cinctipennis,* are readily distinguished by having the sides of the pronotum reflexed at the hind angles and the surface at that point strongly concave.

Podabrus vernalis new species (Text-figs. 4 to 6.)

Head black posteriorly, reddish yellow in front of a line joining approximately the mid-points of the eyes; antennae black, the extreme base of first joint pale; palpi black, pale basally. Pronotum reddish yellow; scutellum and mesonotum black. Elytra black, the lateral marginal bead faintly paler basally. Underside of head and prothorax reddish yellow, balance of ventral surface black. Coxae and femora reddish yellow, the latter black apically and the metacoxae dark externally; tibiae and tarsi black, claws pale. Length 7.5–9.5 mm.

MALE.—Eyes small; head as wide as the pronotum, the black area coarsely and densely punctate, feebly shining, with traces of alutaceous sculpture; epicranium beneath not distinctly punctate except anteriorly, the surface irregularly roughened and sparsely substrigose. Antennae slender, three-fourths as long as the body, clothed with short pubescence which is not conspicuously erect externally, second joint one-half as long as third, median joints nearly three times as long as wide.

Pronotum one-fourth wider than long, widest at middle, lateral margins thence feebly converging to the broadly rounded and scarcely indicated apical angles, more strongly and sinuately converging to the rectangular hind angles which are not rounded and are feebly prominent laterally but not dentiform; surface shining, without alutaceous sculpture, coarsely and moderately densely punctate, more densely apically, slightly substrigose along median line which is not impressed, basal callosities feeble; sides rather broadly subexplanate, somewhat convex, not reflexed except feebly at the hind angles, a small and rather deep rounded impression within the hind angles, a larger and shallower impression at the front angles.

Elytra shining, rugulose, sparsely clothed with rather long and nearly erect cinereous pubescence.

Abdomen dull, secondary pubescence dense throughout, lacking apically; sternite 7 not membraneous medially, sternite 8 broadly and shallowly arcuately emarginate at apex. Legs very slender, the pubescence short, not dense, decumbent on the femora, more erect on the tibiae, especially externally; protibiae and metacoxae not sexually modified; claws acutely toothed, the protarsal narrowly cleft with the tooth slender and over one-half as long as the apical part, tooth of mesotarsal claws very short and of metatarsal

still shorter. Dorsal plate of aedeagus glabrous above, without apical fringe of long hairs, beneath with a narrow marginal band of sparse, short, fine, and inconspicuous pubescence.

FEMALE.—Differs from the male in having the dorsal dark area of the head not attaining the eyes, median only, wider posteriorly; antennae little more than half as long as the body; sternite 8 with a small triangular apical notch; claws with a broad basal tooth, the free angle acute but not produced.

Holotype.—Male; Dead Run, Fairfax County, Virginia, April 14, 1914, R. C. Shannon collector; located in U. S. National Museum collection.

Allotype.—Female; Clemson, South Carolina, April 12, 1940, O. L. Cartwright collector; located in U. S. National Museum collection.

Paratypes.—MARYLAND: Plummers Island, two males. VIRGINIA: Dead Run, Fairfax County, two males. All the paratypes were collected in April. Three paratypes are in the U. S. National Museum collection, the fourth in author's collection.

No variations of importance have been noted for this species. It differs very decidedly from anything heretofore described, but should perhaps be associated with *fissilis* Fall, the only American *Podabrus* previously known in which the claws are all acutely toothed in the male and broadly toothed in the female.

Notes on distribution.

The records cited below extend considerably in each case the known range of the species involved.

Podabrus brimleyi Green. FLORIDA: Lafayette County, March 21, 1930, J. K. Mizell collector, in U. S. National Museum collection. NEW JERSEY: Lakehurst, May 21, 1900, in Amer. Museum of Nat. Hist. collection.

Podabrus frosti Fender. MICHIGAN: Marquette, Hubbard and Schwarz, in U. S. National Museum collection. NEW JERSEY: Lavalette, Siepmann, in collection of J. W. Green.

Podabrus puncticollis Kirby. NORTH CAROLINA: Black Mts., June 27 to July 1, 1930, a good series in Amer. Museum of Nat. Hist. collection. In the same collection are two males from Mt. Washington, N. H., collected by Mrs. A. T. Slosson, that lack the pale sutural borders of the elytra and might therefore be mistaken for *extremus*.

Podabrus limbellus Lec. NORTH CAROLINA: Black Mts., June

27, 1930, three examples in Amer. Museum of Nat. Hist. collection.

Podabrus diadema Fab. NORTH CAROLINA: Black Mts., June 8 to July 1, 1930, in Amer. Museum of Nat. Hist. collection.

EXPLANATION OF FIGURES

The letters a, b, and c signify, respectively, dorsal, lateral, and ventral aspects. Fig. 1.—*Podabrus pygmaeus* new species, male genitalia. Crailhope, Kentucky, IV–30–46, Carl Cook. Fig. 2.—*Podabrus tricostatus* Say, male genitalia. Crailhope, Kentucky, V–21–47, Carl Cook. Fig. 3.—*Podabrus fumiganus* new species, male genitalia. Newfound Gap, Tennessee-N. Carolina, 5000 ft., V–14–46, H. Dietrich. Fig. 4.—*Podabrus vernalis* new species, male genitalia; median lobe extended in c. Dead Run, Fairfax Co., Virginia, IV–14–14, R. C. Shannon. Fig. 5.—Same species, anterior, median, and posterior tarsal claws of male. Fig. 6.—Same species, tarsal claw of female.

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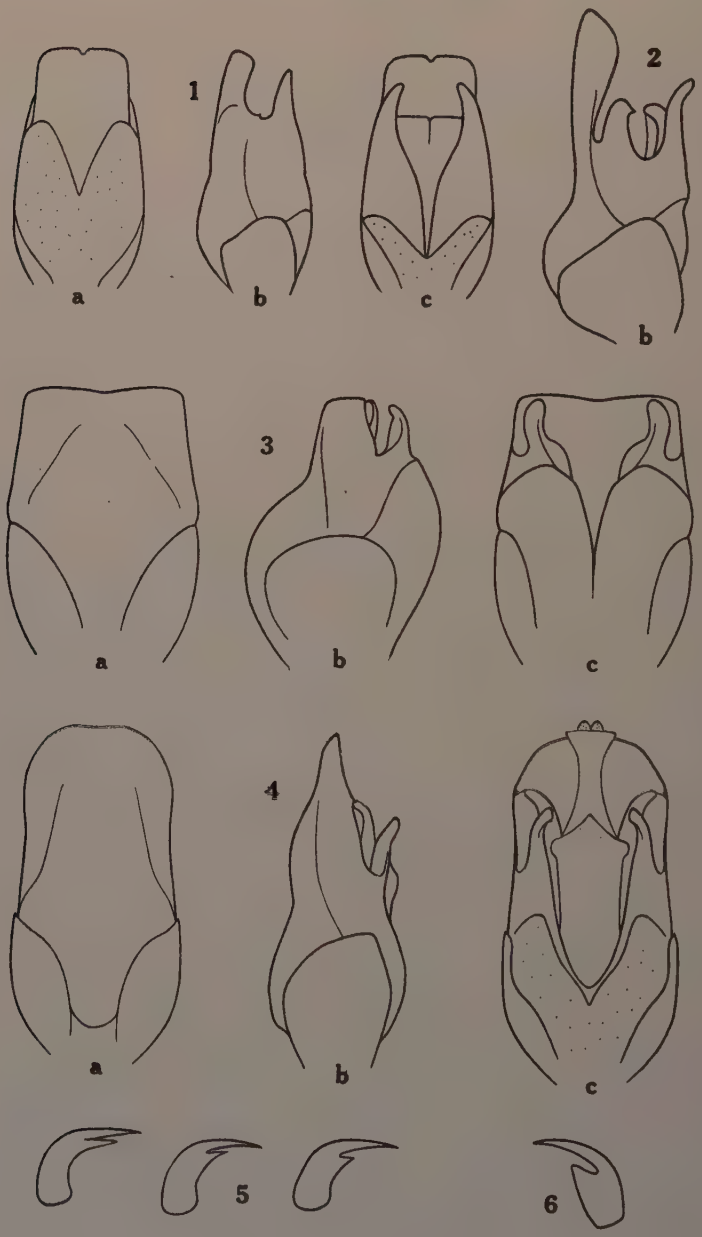
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A REVIEW OF THE SPECIES OF CANTHON INHABITING THE UNITED STATES

(SCARABAEIDAE: COLEOPTERA)

BY MARK ROBINSON

Springfield, Pennsylvania

(Plate I)

Previous to Schmidt's [1] fine key to the species of *Canthon*, Blanchard [2] published a key with notes on the species found in the United States. Blanchard listed fifteen species and four varieties as inhabiting this country. Schmidt's key to the Canthon of the world lists fourteen species found in the United States. The present paper lists twenty-four species, one subspecies and one variety found within the faunal limits of this country. The present review has been written in order to straighten out some of the confusion regarding the status of some of our forms and to add several new species to our fauna.

As is usually the case when one studies a limited fauna, the adjacent fauna must be taken into account in order to determine the distribution of the species. There has been a great deal of confusion about the species of United States insects found near the Mexican border and vice versa. I have taken the liberty in this paper to go into the apparent synonomy of species found below the Mexican border because otherwise our own fauna could not be adequately defined.

Some of our species are quite variable in their external characters and for this reason the male genitalia have been used as the basis of segregating the species. The male genitalia, while varying to a degree among some of the species, are the only single character found absolutely to segregate species in the *puncticollis* and *nigricornis* groups.

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[1] Archiv für Naturgeschichte, LXXXVIII, 1922, p. 61.
[2] Trans. Amer. Ent. Soc., XII, 1885, p. 163.

The habits of these beetles are known to every one who has lived in the country, especially in the southern part of the United States. They are known as "tumble bugs" due to their habit of segregating a ball of dung and rolling it around until they find a suitable place to dig a hole and bury the ball. The eggs are laid in a small opening in the ball and, after hatching, the larvae feed upon the ball until such time as they pupate. From my observations they seem to be most active on hot, sunny days and in a favorable pasture can be collected in considerable numbers.

The insects used as the basis of this paper are located in the collections of the Academy of Natural Sciences of Philadelphia or of the author, with the exception of some of the rarer forms which were kindly loaned for study by R. C. Casselberry. About one thousand specimens were examined during the writing of this review.

The writer wishes to express his thanks to Maurice E. Phillips for the aid he has given during the writing of this paper.

Key to the Species of Canthon

Sides of thorax beneath without entire transverse carina.....1
Sides of thorax beneath with the carina entire to the lateral margin; size small.....21

1. Posterior femora not margined in front; clypeus quadridentate; size small or moderate; color black or dark blue.....2
Posterior femora margined in front.....15

2. Hind tibia with two spurs.....3
Hind tibia with a single spur.....6

3. Granules on the pronotum raised above the surrounding surface....4
Granules on the pronotum reduced to shining spots; punctures quite dense. First joint of hind tarsi one and one-half as long as the second joint.....**punctaticollis**

4. Granules on the pronotum small, punctures rather sparse. First joint of hind tarsi about equal in length to the second joint.....5
Granules on the pronotum larger, denser; punctures obsolete. First joint of hind tarsi one and one-third as long as the second joint. **granulifer**

5. Granules on the pronotum ovate.....**nigricornis**
Granules on the pronotum lanceolate.....**bispinatus**

6. Sutural indentation of the clypeus feeble.....7
Sutural indentation of the clypeus deep, acute.....9

7. Thorax with denticle on the ventral margin; subhumeral striae carinate.....8

Thorax without denticle on the ventral margin; subhumeral striae not carinate.....**simplex**

8. Pronotum punctate.....**melanus**
   Pronotum not punctate.....**lecontei**
9. Subhumeral striae not carinate; upper surface coarsely granulate; spurs of the anterior tibiae acute at the apex in both sexes.....10
   Subhumeral striae carinate; spurs of the anterior tibiae acute at the apex in the females while the males have the apex bifurcate....11
10. Pronotum more coarsely granulate; outer striae of the elytra deeper; hind femora setigerous punctate.....**ebenus**
    Pronotum more densely and less coarsely granulate; outer striae of elytra not deeper than the discal; hind femora sparsely punctate, setae fine.....**depressipennis**
11. Upper surface evenly and finely granulate; pronotum punctate....12
    Upper surface intermixed with coarse and fine granules....**praticola**
12. Pronotum coarsely punctured.....13
    Pronotum very finely punctured.....**probus**
13. The base of the pronotum medially without a well-marked depression.....14
    The base of the pronotum medially with a well-marked depression. **puncticollis**
14. Side margins of thorax not noticeably explanate; side margins of elytra rather abruptly curved upwards just back of the humeral umbone.....**integricollis**
    Side margins of thorax explanate from the median angle forwards; side margins of elytra gently curved upwards just back of the humeral umbone.....**mixtus**
15. Clypeus bidentate.....16
    Clypeus quadridentate, the two middle teeth slender, acute; hind tibia strongly arcuate; bright green or blue in color.....**cyanellus**
16. Pronotum with granules raised above the surrounding surface....17
    Pronotum with shining spots intermixed with fine granules or not at all granulate.....18
17. Pronotum with coarse, raised granules intermixed with fine granules; last ventral and pygidium coarsely granulate.....19
    Pronotum with fine granules intermixed with fine punctures. **indigaceus**
18. Pronotum with shining spots representing the coarse granules, these spots being scattered throughout the fine granules; pygidium and last ventral finely granulate.....**hidalgoensis**
    Pronotum scabrous, pygidium and last ventral finely granulate. **chalcites**
19. Eyes less than half as wide as long when viewed from the dorsal side.....20
    Eyes over half as wide as long when viewed from the dorsal side. **vigilans**

20. Clypeus broadly, shallowly emarginate. Angle formed by the bead of each lateral margin with the basal margin on the prothorax obtuse, well rounded. Submedian angle of each lateral prothoracic margin virtually equidistant from the anterior and posterior prothoracic angles. The banana-shaped mass of dense spinules on the distal part of the internal sac is five times as long as wide.....**laevis**

Clypeus sharply, deeply emarginate; the angle formed by the bead of each lateral margin with the basal margin on the prothorax angular, sharply rounded. The distance from the basal angle to the submedian angle of each lateral prothoracic margin is three-fourths the distance from the latter angle to the anterior angle. The banana-shaped mass of dense spinules on the distal part of the internal sac is two times as long as wide.....**imitator**

21. Clypeus bidentate.....**viridis**

Clypeus quadridentate.....**perplexus**

Canthon punctaticollis Schaeffer (Figs. 41 and 42.)

1915. *Canthon nigricornis* var. *punctaticollis* Schaeffer, Journ. N. Y. Ent. Soc., XXIII, p. 50.

1928. *Canthon punctaticollis* Blatchley (not Schaeffer), Florida Ent., XI, p. 61.

1941. *Canthon punctaticollis* Robinson (not Schaeffer), Trans. Amer. Ent. Soc., LXVII, p. 128.

Specimens of this black, opaque species have been examined only from Florida.

Length, 6.6 to 7.7 mm.; breadth, 4.3 to 5.4 mm.

Type locality: Florida.

Canthon nigricornis Say (Figs. 31 and 32.)

1823. *Ateuchus nigricornis* Say, Journ. Acad. Nat. Sci., Phila., III, p. 207.

1941. *Canthon nigricornis* Robinson (not Say), Trans. Amer. Ent. Soc., LXVII, p. 129.

One male specimen from Texas resembled *granulifer* in size and number of granules on the pronotum but examination of the genitalia readily separated it from that species. This same thing may be true with other specimens of the *nigricornis* group but the genitalia seem to vary very little.

Specimens were examined from Illinois, Michigan, Wisconsin, Nebraska, Missouri, Kansas, Arkansas and Texas.

Length, 6.0 to 7.8 mm.; breadth, 4.5 to 5.3 mm.

Type locality: Cape Gerardeau, Missouri.

Canthon bispinatus Robinson (Figs. 45 and 46.)

1941. *Canthon bispinatus* Robinson, Trans. Amer. Ent. Soc., LXVII, p. 128.

Fourteen specimens of this species were collected by the author at Warren Grove, New Jersey, August 31, 1947, along with two specimens of *Canthon probus* rolling balls of deer droppings along a short stretch of sandy road. Prior to finding these specimens this species was usually collected on dried toadstools in New Jersey.

Specimens have been examined from Rhode Island, New Jersey, Pennsylvania, Virginia, North Carolina, South Carolina, Georgia, Alabama and Florida.

Length, 6.4 to 8.4 mm.; breadth, 4.2 to 6.4 mm.

Type locality: Warren Grove, New Jersey.

Canthon granulifer Schmidt (Figs. 43 and 44.)

1920. *Canthon granulifer* Schmidt, Archiv für Naturgeschichte, Heft 9, p. 126.

On April 15, 1947 at Romeo, Florida, the author collected several specimens of this species in a cow pasture. The specimens were all rolling balls of dung over the ground.

Specimens were seen from Texas and Florida.

Length, 8.0 to 10.5 mm.; breadth, 5.3 to 7.1 mm.

Type locality: Texas.

Canthon simplex Leconte (Figs. 39 and 40.)

1857. *Canthon simplex* Leconte, Pacif. R. R. Rep. App., I, p. 41.
1868. *Canthon corvinus* Harold, Berl. Ent. Zeitschrift, p. 129.
1870. *Canthon simplex* var. *corvinus* Horn (not Harold), Trans. Amer. Ent. Soc., III, p. 46.
1870. *Canthon simplex* var. *militaris* Horn, Trans. Amer. Ent. Soc., III, p. 46.
1870. *Canthon simplex* var. *humeralis* Horn, Trans. Amer. Ent. Soc., III, p. 46.

A great many male specimens of this species were dissected including the types of both of Horn's forms. The genitalia of the examples vary to a slight extent but there does not seem to be any correlation between these variations and any external characters or geographic distribution. The polished humeral umbone, reddish umbone or density of the pronotal punctures as used by Horn to create these varieties do not seem to be sufficient to warrant distinct races without either geographic isolation or genitalic

differences. One of the most striking varieties is *militaris* which Horn distinguished by: "Surface opaque, thorax less punctured, humeri red." This form with the red humeri has been seen from Oregon, California, Arizona and Colorado but the opacity of the surface or density of the punctures is not correlated with the red shoulders in the examples now before the author. These specimens include the series in the Horn collection. I think *simplex* is just a very variable species without any correlation between the external or internal variations and geographic localities, and therefore see no reason for continuing to split it into several varieties.

The illustration of the male genitalia was drawn from a specimen collected in Oregon.

Specimens were examined from British Columbia in Canada; Washington, Oregon, California, Montana, Wyoming, Colorado, Utah, and Arizona in the United States. Examples have also been seen from Sonora, Mexico.

Length, 5.4 to 8.0 mm.; breadth, 3.2 to 5.0 mm.

Type locality: Oregon.

Canthon melanus new species (Figs. 23 and 24.)

The characters used in the key plus the male genitalia will separate this species from allied forms.

Convex, orbicular; opaque with the clypeus and legs shining; black, with the tibial spurs and tarsi dark reddish.

Clypeus quadridentate, the two middle teeth prominent, the clypeal suture weakly incised, giving the effect of a small tooth on the genae. The two middle teeth are reflexed nearly at right angles to the plane of the clypeus. The surface of the clypeus is densely punctured, while the frons is a little less densely punctured and is finely granulate.

Median angle of the thoracic side margin is well rounded, not prominent. Near the anterior angle and just under the side margin is a small, sharp tubercule. The surface of the pronotum is sculptured the same as the frons except the punctures are a little larger laterally.

Elytral striae very fine, barely noticeable laterally. The humeral stria is finely carinate. The elytral intervals are a little more coarsely granulate than the pronotum. The scutellar depression is shallow. The tumid elevation of the second and third elytral intervals at the base is slight.

The pygidium is sculptured about the same as the elytral intervals except the apex which has the granules finer and is more or less shining.

Anterior tibiae tridentate and crenate between the teeth and above the third tooth. Posterior tibiae with one spur at the apex.

MALE.—Anterior tibial spur elongate, broadest at the tip which is triangularly emarginate, the outer angle of which is slightly longer than the inner. The apex of the pygidium is rounder when viewed from the side than that of the female.

FEMALE.—Anterior tibial spur long, curved outward, acute at the tip.

Length, 5.3 to 5.8 mm.; breadth, 3.2 to 3.5 mm.

Type.—♂; base of Pinal Mountains, Arizona, May 14, 1934 (D. K. Duncan). In the collection of the author.

Allotype.—♀; with the same data as the type.

Paratypes.—♂; Hereford, Arizona, July 28, 1907. ♂; Santa Rita Mountains, Arizona. ♂; Arizona. ♂; Guaymas, Mexico, April 10, 1938 (R. H. Crandall). Paratypes are deposited in the collections of the Academy of Natural Sciences of Philadelphia, R. C. Casselberry and the author.

Canthon lecontei Harold (Figs. 21 and 22.)

1868. *Canthon lecontei* Harold, Berl. Ent. Zeitschr., p. 68.

While the pronotal sculpturing is finely granulate, the granules are coarser than they are in allied forms. This species has been allied to the forms with a sharp, deep indentation of the clypeal suture by other authors. None of the specimens examined by this author has this deep indentation.

All the specimens examined were collected in Texas.

Length, 4.3 to 5.5 mm.; breadth, 2.5 to 3.4 mm.

Type locality: Texas.

Canthon probus Germar (Figs. 19 and 20.)

1824. *Ateuchus probus* Germar, Insectorum species novae, Halae, p. 98.
1859. *Canthon abrasus* Leconte, Smithson. Cont. Knowl., XI, p. 10.

The typical form of this species has a long thin carina in place of the humeral stria but specimens from Miami and other sections of southern Florida lack this carina or have it very faintly indicated. No other differences have been noted in these south Florida specimens. Specimens from Kansas, Oklahoma and Texas are not usually as densely punctured on the pronotum and the small shining spots on the pronotum are more noticeable than in the eastern specimens. This western form was described by Leconte

as *abrasus* but I do not think that it is deserving of a separate name as the genitalia of all the specimens examined varied but little from those of the eastern specimens.

Specimens were examined from New Jersey, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Kansas, Oklahoma, Texas and Utah.

Length, 3.8 to 6.5 mm.; breadth, 2.6 to 4.0 mm.

Type locality: America septentrionali (Kentucky).

Canthon puncticollis Leconte (Figs. 29 and 30.)

1866. *Canthon puncticollis* Leconte, Proc. Acad. Nat. Sci. Phila., p. 381.
1889. *Canthon nyctelius* Bates, Biol. Cent. Amer., Col., II, pt. 2, p. 31.

A female cotype specimen of *nyctelius* collected at Santa Clara, Chihuahua, Mexico by Hoge was compared to specimens of typical *puncticollis* collected at San José del Cabo, Mexico. It agrees in all external characters but due to the difficulty of distinguishing externally this and the following two species the final disposition of *nyctelius* will lie in an examination of the genitalia of a male specimen.

Specimens were seen that had been collected in Arizona plus the localities mentioned above from Mexico.

Length, 4.8 to 6.0 mm.; breadth, 2.8 to 3.5 mm.

Type locality: Cape St. Lucas, Baja California.

Canthon integricollis Schaeffer (Figs. 27 and 28.)

1915. *Canthon puncticollis* var. *integricollis* Schaeffer, Journ. N. Y. Ent. Soc., XXIII, p. 50.

This variety was described from Hidalgo (type) and Brownsville, Texas and Santa Rita Mountains, Arizona. A male paratype from the type locality was used to draw the sketch of the genitalia. In view of the difference between the genitalia of this form and of *puncticollis* plus the external differences noted in the key, I believe they are separate species.

All the specimens checked were from Texas. A male paratype of *integricollis* collected in the Santa Rita Mountains, Arizona, proves to be the new species *melanus*.

Length, 4.6 to 5.8 mm.; breadth, 2.7 to 3.4 mm.

Type locality: Hidalgo, Texas.

Canthon mixtus new species (Figs. 25 and 26.)

The depression at the base of the thorax in *puncticollis* is here weakly indicated. From *puncticollis* and *integricollis* this species can be distinguished by the explanate side margins of the thorax, the side margins of the elytra gently curved back of the humeral umbone and the male genitalic claspers.

Ovate; opaque except the claspers, apex of the pygidium and legs are shining. Black; with the frons, pronotum, elytra and posterior part of the pygidium dark blue.

Clypeus quadridentate, the large triangular teeth prominent. The clypeal suture is deeply incised, giving the impression of a large tooth on the genae. Clypeus densely punctured; the frons finely granulate intermixed with a few punctures.

Pronotal side margins explanate from the median angles forward. Carina beneath the thoracic side margins obsolete. Tubercle beneath the side margin near the anterior angle well indicated. The surface of the pronotum is finely granulate intermixed with rather coarse punctures.

The side margins of the elytra are gently curved upwards just back of the humeral umbone. The tumid elevation of the second and third intervals at the base is well raised. The elytral striae are shallow while the intervals are a little more coarsely granulate than the pronotum. The subhumeral stria is finely carinate.

The anterior tibia is tridentate, crenate above the third tooth and between all the teeth. The posterior tibia has a single spur at the apex. The pygidium basally is granulate like the pronotum and at the apex it is sparsely punctate.

MALE.—Anterior tibial spur elongate, broadest at the tip which is triangularly emarginate, the outer angle of which is slightly longer than the inner. The apex of the pygidium is rounder when viewed from the side than that of the female.

FEMALE.—Anterior tibial spur long, curved outward, acute at the tip.

Length, 4.8 to 5.8 mm.; breadth, 2.8 to 3.5 mm.

Type.—♂; Marfa, Texas, July 5 (H. A. Wenzel).

Allotype.—♀; with the same data as the type.

Paratype.—♂; with the same data as the type.

The type and allotype are in the collection of the author due to the kindness of Mr. R. C. Casselberry. The paratype is in the collection of Mr. Casselberry.

Canthon praticola Leconte (Figs. 37 and 38.)

1859. *Canthon praticola* Leconte, Smithson. Cont. Knowl., XI, p. 10.

The characters set forth in the key should be sufficient to sep-

arate this species from any other in our fauna.

The following provinces and states are represented in the collection: British Columbia, Alberta in Canada; Wyoming, Colorado, Kansas, Oklahoma, Texas and Arizona in the United States and Sonora in Mexico.

Length, 7.5 to 9.6 mm.; breadth, 4.5 to 5.7 mm.

Type locality: Kansas.

Canthon depressipennis Leconte (Figs. 11 and 12.)

1859. *Canthon depressipennis* Leconte, Smithson. Cont. Knowl., XI, p. 10.

Southern specimens of this species sometimes have a greenish tint. The male genitalia plus the characters given in the key should be sufficient to separate this species from any other.

Specimens were studied from Arkansas, South Carolina, Georgia and Florida.

Length, 8.0 to 10.0 mm.; breadth, 4.5 to 5.5 mm.

Type locality: Georgia.

Canthon ebenus Say (Figs. 13 and 14.)

1823. *Ateuchus ebenus* Say, Journ. Acad. Nat. Sci., Phila., III, p. 208.

The characters in the key should be sufficient to separate this midwestern species.

States represented in the collection at hand are South Dakota, Nebraska, Kansas, Colorado, New Mexico and Texas.

Length, 7.5 to 11.4 mm.; breadth, 4.8 to 6.0 mm.

Type locality: Missouri.

Canthon hidalgoensis Bates (Figs. 5 and 6.)

1887. *Canthon hidalgoensis* Bates, Biol. Cent. Amer., Col., II, pt. 2, p. 32.

I refer to this species four specimens collected at Brownsville, Texas, June, 1901, probably collected by C. Schaeffer. The specimens agree with Bates's description except they are blue in color. While no specimens of *hidalgoensis* from Hidalgo have been examined, other examples from more northern localities in Mexico show no variation from the Texan specimens, except some are black while others are dark bluish.

The pronotum is finely punctate in addition to the other sculpturing mentioned in the key. The shining spots on the elytra have more height than those on the pronotum thus resembling

coarse, low granules.

Length, 10.8 to 13.0 mm.; breadth, 7.0 to 8.5 mm.

Type locality: Zacualtipan in Hidalgo, Mexico.

Canthon laevis Drury (Figs. 7 and 8.)

1758. *Scarabaeus pilularius* Linnaeus, Systema Naturae, p. 349.
1770. *Scarabaeus laevis* Drury, Exot. Ins., I, index and p. 79.
1771. *Scarabaeus hudsonias* Forster, Nov. Spec. Ins., p. 3.
1870. *Canthon laevis* var. *viridescens* Horn, Trans. Amer. Ent. Soc., III, p. 47.

The name of this species has been confused for nearly a century and a half and in recent years has been discussed again by several authors. None of the recent authors who have entered into the discussion concerning the synonomy of this species seem to be in agreement as to which name should apply. The name *pilularius* used by Linnaeus appears to refer to a European insect or at least should be accepted as such until definite proof can be found to establish it as an American insect. This proof so far has not been forthcoming, therefore the south European insect belonging to the genus *Gymnopleurus* should retain its present specific identity.

Harold 1870 and 1871 and also Lane 1947 have pointed out that Drury published his description of *laevis* in his 1773 volume. In the Academy of Natural Science library Drury's description appears in the 1770 volume and is not mentioned in the second volume published in 1773. For the above reasons I feel that the name *laevis* should be used for this common insect as it has been for so many years.

The color of this species varies from black to bronze and in Florida a variety is found (*viridescens*) that is green.

Specimens of this species were examined from Pennsylvania, Montana, North Carolina, South Carolina, Georgia, Florida, Alabama and Louisiana.

Length, 10.3 to 18.5 mm.; breadth, 7.5 to 11.0 mm.

Type locality: New York.

Canthon imitator Brown (Figs. 9 and 10.)

1946. *Canthon imitator imitator* Brown, Can. Ent., LXXVIII, p. 104.
1946. *Canthon imitator floridanus* Brown, Can. Ent., LXXVIII, p. 105.

This species is very close to *laevis* and like that species is very variable. The only characters to distinguish *imitator* from the

older species, which appear to be constant are those mentioned in the key. The male genitalia of *imitator* are also variable and the specimen from which the drawing was made was collected at Green Valley, Brewster County, Texas on July 14, 1911 by H. A. Wenzel. The specimens from southern Texas, Arizona and Mexico seem to differ more from *laevis* than do the typical specimens from Payne County, Oklahoma. The large granules on the prothorax of this species are sparser than they are in typical *laevis;* they are about the same density as southern specimens of the latter species.

Specimens have been examined from Oklahoma, Colorado, Texas and Arizona in the United States and Nuevo Leon in Mexico.

The subspecies *floridanus* has not been seen by the writer, so the remarks by the author of this form are included as given. This subspecies has been recorded only from Alachua County, Florida. Brown's remarks are: "Anterior tibiae with their inner margins not curved opposite the large teeth, these tibiae therefore straight as in *laevis*. Middle femora as in *laevis,* lacking an impressed line on their anterior margins. Posterior tarsi a trifle shorter than the middle tarsi, but relatively longer than in *laevis*. Male copulatory organ with the toe of the bootlike process of each lateral lobe as in *laevis,* the toe produced more strongly and more obliquely than in typical *imitator*. Other characters, including those of the internal sac, as in typical *imitator*."

Length, 13 to 17.5 mm.; breadth, 8.6 to 10.7 mm.

Type locality: Payne County, Oklahoma.

Canthon vigilans Leconte (Figs. 1 and 2.)

1858. *Canthon vigilans* Leconte, Journ. Acad. Nat. Sci., Phila., ser. 2, IV, p. 16.

There is very little difference between this species and some specimens of *imitator* except the width of the eyes and the male genitalia. All the specimens examined were black, with an occasional greenish or bronze tint.

Specimens examined were collected in the following states: Massachusetts, New Jersey, Illinois, South Carolina, Oklahoma, Alabama, Florida and Texas.

Length, 12.5 to 17.6 mm.; breadth, 9.0 to 11.8 mm.
Type locality: Texas.

Canthon chalcites Haldeman (Figs. 3 and 4.)

1843. *Coprobius chalcites* Haldeman, Proc. Acad. Nat. Sci., Phila., I, p. 304.

The sculpturing on the head of this species is about the same as on the pronotum. The elytral intervals have a covering of fine granules mixed with coarse granules. I have seen two specimens from the mountains of Pennsylvania that have these coarse granules on the elytra reduced to virtually shining spots without any height. A form from southern Florida has been examined which has the elytral coarse granules ovate in outline. Both of the above forms may prove to be subspecific races when more material becomes available. The type locality of this species is Missouri and all specimens seen from this and surrounding states were bronze in color with the coarse elytral granules round in shape. The eastern specimens of this species are black.

The localities from which specimens of this species were examined are as follows: Missouri, Pennsylvania, New Jersey, Tennessee, North Carolina, South Carolina, Georgia and Florida.

Length, 14.0 to 18.2 mm.; breadth, 8.5 to 12.0 mm.
Type locality: Missouri.

Canthon indigaceus Leconte (Figs. 33 and 34.)

1832. *Ateuchus humectus* Say, New sp. N. Amer. Ins., p. 4.
1863. *Canthon gagatinus* Harold, Ann. Soc. Ent. Fr., p. 173.
1866. *Canthon indigaceus* Leconte, Proc. Acad. Nat. Sci., Phila., p. 380.
1868. *Canthon chevrolati* Harold, Berl. Ent. Zeitschr., p. 119.
1887. *Canthon gagatinus* Bates (not Harold), Biol. Cent. Amer., Col., II, pt. 2, p. 33.
1889. *Canthon humectus* Bates (not Say), Biol. Cent. Amer., Col., II, pt. 2, p. 386.

Bates, on the recommendation of M. Salle and G. Horn, reduced *gagatinus* and *indigaceus* to synonomy under *humectus*. This was done in the supplement to the Biologia issued in 1889.

The status of *Canthon gagatinus* remains obscure and it is probably best to leave it in synonomy until such time as the genitalia of the type can be checked. A specimen determined as *gagatinus* by Bates from the Biologia collection labeled, N. Sonora, Mexico

(Morrison) proves to be *indigaceus*. These specimens collected by Morrison in N. Sonora were recorded by Bates in the 1887 volume of the Biologia and therefore this specimen was labeled before Bates reduced this form to synonomy in the 1889 supplement to the Biologia.

Canthon humectus from Biologia material, and as accepted by present day entomologists, is a large dark blue form which is orbicular in outline and is found near Vera Cruz and Mexico City in Mexico. Specimens examined by the author from these localities fit very well with Say's description of *humectus*. This is also the area which Say visited while in Mexico. The type of *indigaceus* and all other specimens examined are ovate in outline and are smaller in size than *humectus*. In addition the male genitalia of the two forms are distinctly different and therefore I think they are separate species.

Canthon chevrolati is closely related to this species but can be distinguished by the lack of the thoracic tubercle, the evenly convex pygidium and the male genitalia. The Mexican *chevrolati* does not appear to be found in the northern part of that country and should not be confused with specimens of *indigaceus*.

The transverse carina beneath the thoracic side margin is not well marked. The tubercle below the margin near the anterior angle is usually well indicated. The humeral stria is never carinate. The pygidium is concave before and strongly convex at the posterior two-thirds.

Specimens have been examined from Arizona and Texas in the United States. In addition examples were seen from Sonora, Sinaloa, Nayarit and Jalisco in Mexico.

Length, 8.5 to 12 mm.; breadth, 5.2 to 7.3 mm.

Type locality: Fort Whipple, Arizona.

Canthon cyanellus Leconte (Figs. 35 and 36.)

1859. *Canthon cyanellus* Leconte, Smithson. Cont. Knowl., XI, p. 11.

The transverse carina beneath the thoracic side margin is barely indicated and the tubercle beneath the margin near the anterior angle is obsolete. The sculpturing of the head and pronotum is very finely granulate, mixed with fine but densely placed punctures. The elytra are more evidently granulate and less densely

punctate. The humeral stria is finely carinate throughout its length.

All the specimens from the United States were collected in Texas and are either blue or green in color. This species is found as far south as Peru and Brazil and in some of the Central and South American localities distinct subspecies are recognizable due chiefly to color variations. There appears to be no difference in the male genitalia of any of these geographic races from the typical Texan form.

Length, 6.8 to 9.0 mm.; breadth, 3.7 to 6.2 mm.

Type locality: Texas.

Canthon viridis Beauvois (Figs. 15 and 16.)

1805. *Copris viridis* Beauvois, Ins. Afr. et Amer., p. 24.

This pretty little insect is found over most of the eastern United States. It varies in color from bright green to bronze. The hind thighs are not margined in front and the thoracic tubercle is obsolete. The dorsal sculpturing is finely granulate mixed with fine punctures on the head and pronotum. The granules on the elytra are a little coarser than on the pronotum.

Specimens were examined from New York, New Jersey, Pennsylvania, Minnesota, North Carolina, South Carolina and Florida.

Length, 2.7 to 4.5 mm.; breadth, 1.8 to 2.8 mm.

Type locality: Carolina of the south United States.

Canthon perplexus Leconte (Figs. 17 and 18.)

1847. *Canthon perplexus* Leconte, Journ. Acad. Nat. Sci., Phila., Ser. 2, 1, p. 85.

The hind femora are margined in front. There is not a trace of a tubercle under the side margin near the front angle. Each coarse puncture on the upper side of this small beetle bears a short, recumbent hair. Specimens from the western part of the range of this insect appear to be larger but no other differences have been noticed.

Examples were studied from Florida, Louisiana, Texas and Arizona.

Length, 3.5 to 4.8 mm.; breadth, 2.1 to 3.2 mm.

Type locality: Texas.

Explanation of Figures

Plate I

(*Figures not to scale*)

Fig. 1.—*Canthon vigilans* Leconte. Lateral view of left clasper. Massachusetts.
Fig. 2.—*Canthon vigilans* Leconte. Caudal view of claspers.
Fig. 3.—*Canthon chalcites* Haldeman. Lateral view of left clasper. Green County, Missouri.
Fig. 4.—*Canthon chalcites* Haldeman. Caudal view of claspers.
Fig. 5.—*Canthon hidalgoensis* Bates. Lateral view of left clasper. Brownsville, Texas.
Fig. 6.—*Canthon hidalgoensis* Bates. Caudal view of claspers.
Fig. 7.—*Canthon laevis* Drury. Lateral view of left clasper. Beaufort, South Carolina.
Fig. 8.—*Canthon laevis* Drury. Caudal view of claspers.
Fig. 9.—*Canthon imitator* Brown. Lateral view of left clasper. Brewster County, Texas.
Fig. 10.—*Canthon imitator* Brown. Caudal view of claspers.
Fig. 11.—*Canthon depressipennis* Leconte. Lateral view of left clasper. Dover, Florida.
Fig. 12.—*Canthon depressipennis* Leconte. Caudal view of claspers.
Fig. 13.—*Canthon ebenus* Say. Lateral view of left clasper. Reno County, Kansas.
Fig. 14.—*Canthon ebenus* Say. Caudal view of claspers.
Fig. 15.—*Canthon viridis* Beauvois. Lateral view of left clasper. Downingtown, Pennsylvania.
Fig. 16.—*Canthon viridis* Beauvois. Caudal view of claspers.
Fig. 17.—*Canthon perplexus* Leconte. Lateral view of left clasper. Venice, Florida.
Fig. 18.—*Canthon perplexus* Leconte. Caudal view of claspers.
Fig. 19.—*Canthon probus* Germar. Lateral view of left clasper. Warren Grove, New Jersey.
Fig. 20.—*Canthon probus* Germar. Caudal view of claspers.
Fig. 21.—*Canthon lecontei* Harold. Lateral view of left clasper. Brownsville, Texas.
Fig. 22.—*Canthon lecontei* Harold. Caudal view of claspers.
Fig. 23.—*Canthon melanus* new species. Lateral view of left clasper. (Type), Base of Pinal Mountains, Arizona.
Fig. 24.—*Canthon melanus* new species. Caudal view of claspers.
Fig. 25.—*Canthon mixtus* new species. Lateral view of left clasper. (Type), Marfa, Texas.
Fig. 26.—*Canthon mixtus* new species. Caudal view of claspers.
Fig. 27.—*Canthon integricollis* Schaeffer. Lateral view of left clasper. (Paratype), Hidalgo, Texas.

Fig. 28.—*Canthon integricollis* Schaeffer. Caudal view of claspers.
Fig. 29.—*Canthon puncticollis* Leconte. Lateral view of left clasper. San José del Cabo.
Fig. 30.—*Canthon puncticollis* Leconte. Caudal view of claspers.
Fig. 31.—*Canthon nigricornis* Say. Lateral view of left clasper. Sylvan, Kansas.
Fig. 32.—*Canthon nigricornis* Say. Caudal view of claspers.
Fig. 33.—*Canthon indigaceus* Leconte. Lateral view of left clasper. Baboquivari Mountains, Arizona.
Fig. 34.—*Canthon indigaceus* Leconte. Caudal view of claspers.
Fig. 35.—*Canthon cyanellus* Leconte. Lateral view of left clasper. Texas.
Fig. 36.—*Canthon cyanellus* Leconte. Caudal view of claspers.
Fig. 37.—*Canthon praticola* Leconte. Lateral view of left clasper. Kansas.
Fig. 38.—*Canthon praticola* Leconte. Caudal view of claspers.
Fig. 39.—*Canthon simplex* Leconte. Lateral view of left clasper. Oregon.
Fig. 40.—*Canthon simplex* Leconte. Caudal view of claspers.
Fig. 41.—*Canthon punctaticollis* Schaeffer. Lateral view of left clasper. (Type), Florida.
Fig. 42.—*Canthon punctaticollis* Schaeffer. Caudal view of claspers.
Fig. 43.—*Canthon granulifer* Schmidt. Lateral view of left clasper. Texas.
Fig. 44.—*Canthon granulifer* Schmidt. Caudal view of claspers.
Fig. 45.—*Canthon bispinatus* Robinson. Lateral view of left clasper. (Type), Warren Grove, New Jersey.
Fig. 46.—*Canthon bispinatus* Robinson. Caudal view of claspers.

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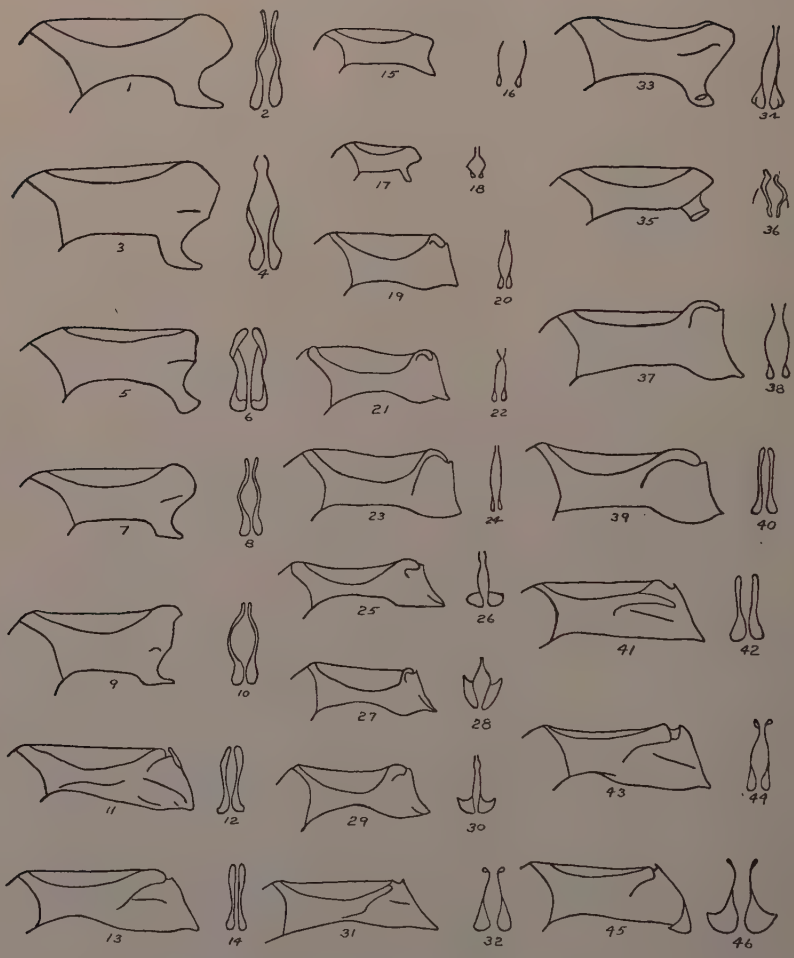

ROBINSON—GENUS CANTHON

A PRELIMINARY GENERIC REVISION OF THE HIGHER DACETINI

(HYMENOPTERA: FORMICIDAE)

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(Text-figures)

The list given below includes new generic and subgeneric names for dacetine species hitherto included in the genera *Strumigenys* Fred. Smith, *Epitritus* Emery, *Epopostruma* Forel, and *Codiomyrmex* Wheeler. There are also indicated some major and minor changes with regard to the status of several older names. The present paper is to be regarded as strictly preliminary in nature, its main purpose being to clarify the highly confused generic classification in the *Dacetini* in time for the inclusion of the corrected system in large area works on the *Formicidae* now being prepared in North America, Australia and elsewhere within the range of the tribe. A full revision of the world *Dacetini* upon which the author has embarked will further discuss the changes made herein and afford fuller descriptions, keys, figures and other material of taxonomic value. Several of the genera here listed may undergo further division on the subgeneric or generic levels. This is true especially of *Strumigenys* and *Smithistruma* new genus. The study is not far enough advanced at present to include these relatively unimportant changes.

Abbreviated synonymies and outstanding characters of the groups involved are included for the convenience of compilators; they are not intended to be comprehensive.

An artificial key is given at the end of this paper which, it is hoped, will afford a rapid means of identifying to genus any dacetine ant described up to the present. There are undoubtedly

a large number of totally new genera as yet uncollected, since the habits of the tribe in general are such as to cause them to be poorly represented in collections out of all proportion to probable abundance in many localities.

In the list given immediately below, an asterisk (*) following a generic or subgeneric name indicates that the description and discussion given in the body of the paper is adapted from the original description and figures plus such other references as could be found in the literature; in none of these cases has the present author seen examples of the insects discussed. The absence of an asterisk with a name means that at least one species has been examined during the course of the preparation of this work.

List of Genera and Subgenera of the Dacetini

Acanthidris Weber *
Acanthognathus Mayr
Alistruma new genus
Basiceros Fred. Smith
Clarkistruma new genus
Codiomyrmex Wheeler
Colobostruma Wheeler
Daceton Perty
Dorisidris new genus *
Epitritus Emery
Epopostruma Forel
Glamyromyrmex Wheeler
Heptastruma Weber *
Hexadaceton new genus
Hypopomyrmex Emery *
Labidogenys Roger
Mesostruma new genus
Miccostruma new genus *
Microdaceton Santschi *
Neostruma new genus
Octostruma Forel
Orectognathus Fred. Smith
Pentastruma Forel *
Peronomyrmex Viehmeyer *
Rhopalothrix Mayr
Smithistruma new genus
  Serrastruma new subgenus
  Smithistruma new subgenus
  Weberistruma new subgenus
  Wessonistruma new subgenus
Strumigenys Fred. Smith
  subgenus Strumigenys s. str.
  subgenus Pyramica Roger
Talaridris Weber *
Tingimyrmex Mann

Genera with Six-jointed Antennae, Formerly Included in Strumigenys Fred. Smith

LABIDOGENYS Roger (fig. 1)

1862. *Labidogenys* Roger, Berlin. Ent. Zeitschr., VI, pp. 249–250, Pl. 1, fig. 17, worker.

1863. *Strumigenys* Fred. Smith, *sensu* Roger, part. Verz. Formicid, p. 40.

Specimens from the Philippines and Java, which agree quite well with Roger's original description of *L. lyroessa* from Ceylon, show

that the original generic designation was a correct one. The distinctive characters are the dorso-ventrally flattened head and the peculiar structure of the mandibles, which differ from those of *Strumigenys* in that they are abruptly expanded in a lateral direction just distad of the anterior clypeal border and gradually nar-

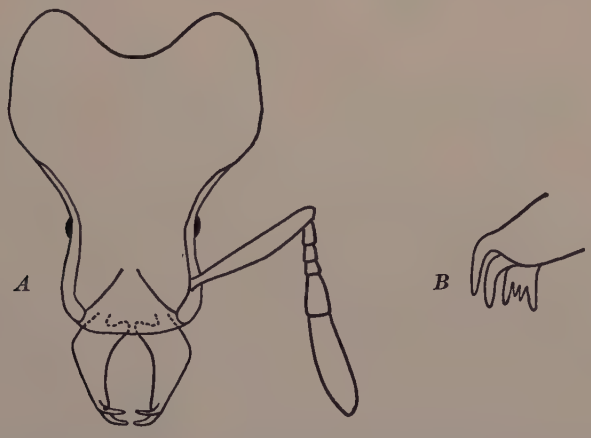

Fig. 1.—*Labidogenys* sp. near *lyroessa* Roger, worker. A. Outline of dorsal aspect of head. B. Enlargement of tip of mandible viewed from the dorsal side and looking toward the apex. Buitenzorg, Java.

rowed from that point on to the apices. The tip of each mandible bears an apical fork and one prominent preapical tooth, and the inner border just at, and beneath, the anterior apron of the clypeus bears a prominent lamellate lobe, of which the apex is rounded and directed inward and posteriorly when the mandibles are closed. The mandibles when closed tilt somewhat dorsad from the median longitudinal axis of the head. Thorax depressed and rather broad anteriorly, but not laterally marginate. Otherwise much as in *Strumigenys;* size small.

GENOTYPE: *Labidogenys lyroessa* Roger, 1862, Berlin. Ent. Zeitschr., VI, p. 251, Pl. 1, fig. 17, worker. (Monobasic.)

Includes also the species *L. emdeni* Forel from Australia, and probably *biroi* Emery from New Guinea.

SMITHISTRUMA new genus

1863. *Strumigenys* Fred. Smith; *sensu* Roger, part. Verz. Formicid, p. 40.
1864. *Cephaloxys* Fred. Smith, name preoccupied. Journ. Linn. Soc. Lond., VIII, p. 77.
1869. *Strumigenys* (*Trichoscapa*) Emery, part. Ann. Accad. Aspir. Nat. Napoli (2), II, p. 24.
1875. *Epitritus* Emery, part. Bull. Soc. Ent. Ital., I, p. 136.
1922. *Strumigenys* (*Cephaloxys*) *sensu* Emery, part, subgeneric name preoccupied. Gen. Ins., Hymen., Fasc. 174, p. 134.

Mandible narrowly triangular to linear-subtriangular, somewhat depressed and with fairly well-developed basal border differentiated from the apical border and running obliquely to the longitudinal axis of the head, often partially or wholly hidden beneath the clypeal apron when the mandibles are closed. The apical mandibular borders serially toothed, minutely serrate, or, rarely, with serrulation reduced to practically edentate condition, meeting each other on or near the anterior projection of the median longitudinal axis of the head, though more or less of the apical portions may be slightly deflected ventrally. The teeth when present are crowded and vary in size and shape with the species and also often among themselves on an individual mandible, usually more than ten in number, the apicalmost not modified into a prominent forklike structure.

Rest of head and the body in general much like that of *Strumigenys*. Characteristically with abundant hairs on the dorsum of the head, these often bizarre in form. Sculpture of head, thorax and petiolar and postpetiolar nodes for the most part granular and opaque, of the gaster, usually smooth and shining, with fine longitudinal striae at the base as in most *Strumigenys*. Epinotum armed with spines, lamellae, or both, spongiform appendages of petiole and postpetiole most often abundantly developed. Size small to very small; color varying from testaceous to blackish ferrugineous.

GENOTYPE: *Strumigenys pulchella* Emery, 1895, Zool. Jahrb. Syst., VIII, pp. 327–328, Pl. 8, fig. 19, worker. (By present designation.)

This genus is erected to receive the "short-mandibulate" species which formed the subgenus *Cephaloxys* of *Strumigenys*. M. R. Smith has shown that the subgeneric name is preoccupied and that Emery's old subgeneric name *Trichoscapa* is available for the group as next choice. The type of *Trichoscapa,* however, is Emery's *T. membranifera,* which here is regarded as completely separate generically from the great majority of forms heretofore included in *Strumigenys*. With certain other minor exceptions, this majority of short-mandibulate forms is elevated to the rank of genus and given the new name which this act requires.

This genus is named for Dr. Marion R. Smith of the United States National Museum, an outstanding myrmecologist and the first reviser of the North American *Strumigenys*. Dr. Smith's constant attention and aid in my revisionary studies of the *Dacetini* has proven the greatest single factor in rendering the relationships within the tribe intelligible, and his loans of material from the National Museum and Mann collections form the backbone of my New World material.

Smithistruma is a large and heterogeneous group which will undoubtedly be further split in the future, but until more detailed studies are made, only the four subdivisions listed below may be safely made. The Wessons have shown that many of the North American species subsist for the most part on *Collembola,* which animals they capture in a very characteristic way. The genus is nearly world-wide in distribution apparently found lacking only in the colder parts of Canada and the Rockies, northern Eurasia, New Zealand, Australia, and the "Antarctic Tip" of South America.

Smithistruma new subgenus

Mandibles projecting beyond most anterior point of the anterior clypeal border to a distance of from one-half to one and one-half times the greatest length of the clypeus. Mandibular teeth less than twenty in number, usually crowded and non-uniform in a characteristic pattern varying with the species. Basalmost tooth differentiated from the apical series, in the form of an enlarged, stout, erect, acute tooth or a plate-like and often translucent lamella, placed immediately adjacent to the basalmost tooth of the apical series or separated by a distinct diastema from the latter. This tooth marks the approximate position of the angle between the basal and apical mandibular borders and is often partially or wholly hidden beneath the clypeal apron when the jaws are closed.

Head hairs, especially those of the clypeus, abundant, well-developed and often bizarre in shape.

SUBGENOTYPE: same as for the genus.

Includes the Mediterranean *baudueri* Emery; the East Asian *japonica* Ito; the Indomalayan species *capitata* Fred. Smith, *jacobsoni* Menozzi, *karawajewi* Brown, *dohertyi* Emery, *inezae* Forel and its subspecies, and several undescribed forms under study at present; the African species *emarginata* Mayr and *transversa* Santschi and all the New World species formerly included in

Strumigenys (*Cephaloxys*) except *membranifera* Emery and its subspecific forms and the two species *pergandei* Emery and *angulata* M. R. Smith.

Wessonistruma new subgenus

Mandibles slender, subarcuate; roughly speaking, the exposed portion of the mandibles equal to the length of the clypeus; basal tooth stout, acute, situated just anterior to the clypeal border and separated from the apical series of teeth by a very large diastema which is nearly as long as, to longer than, the space occupied by the apical series. Clypeus rather broad, at least the middle portion of its anterior edge transverse. Head hairs squamiform, broadly suborbicular to orbicular on at least the vertex. Otherwise much as in the subgenus *Smithistruma* s. str.

SUBGENOTYPE: *Strumigenys pergandei* Emery, 1895, Zool. Jahrb. Syst., VIII, pp. 326–327, Pl. 8, figs. 17, 18, worker, female, male. (By present designation.)

This genus is named for Dr. Laurence G. Wesson, Jr., who, with his brother, Mr. Robert G. Wesson, has made the first significant step toward solving the mysteries of dacetine biology, and who has added several interesting new species to the North American fauna. The author is deeply indebted to these two workers for their contributions of specimens and advice toward the completion of the revision.

Wessonistruma embraces the common species *pergandei,* which ranges from southern Canada through the eastern half of the United States to Virginia and Tennessee, and the rare species *angulata* M. R. Smith from the Mississippi Valley.

Weberistruma new subgenus

Head elongate to about the same degree as in *Smithistruma* (*S*). *clypeata* Roger and related species, with convex, shining clypeal surface. Mandibles very convex for a *Smithistruma,* the entire exposed portion of the apical borders set with crowded acute teeth. Since only one specimen is available, and that the *holotype* of *leptothrix* Wheeler, it was felt undesirable to attempt the opening of the mandibles so as to ascertain the possible occurrence of a differentiated basal tooth. Dorsal surface of head above with longitudinal rugation, hairs on upper dorsum of head erect and somewhat anteriorly directed, remarkably long and slender, with en-

larged tips. Hairs on clypeus very much reduced and closely appressed to the surface of the clypeus, which they do not obscure to any significant degree.

SUBGENOTYPE: *Strumigenys (Cephaloxys) leptothrix* Wheeler, 1929, Boll. Lab. Zool. Portici, XXIV, pp. 55–57, fig. 7, worker. (Monobasic.)

The subgenus is named in honor of Dr. Neal A. Weber in recognition of his important work with New World *Dacetini,* of which he has described three genera and numerous species. His aid and encouragement has been a large factor contributing toward the present work.

Known only from the type specimen of *leptothrix,* which was collected in Formosa by Professor Filippo Silvestri.

Serrastruma new subgenus

Form and dentition of the mandibles seem to set this African section off from the rest of *Smithistruma.* The mandibles are longer than the clypeus when measured from the anterior clypeal border to their apices; in most species they are very much longer, surpassing most *Smithistruma* in this respect. Seen from the front, they are narrowly triangular and display straight apical borders which meet each other on the median line. Seen from the side, they are noticeably depressed and arching from anterior to posterior, the tips rather strongly deflected ventrally. Apical and basal borders differentiated and meeting at an obtuse angle, the basal border running obliquely upward and outward from the proximal end of the apical border. The basal tooth not, or only faintly, differentiated from the apical series and not separated from the series by a diastema. Apical series composed of minute, regularly arranged denticulae numbering more than twenty on each mandible, the denticulation rarely so reduced as to make the apical border practically edentate. The apical tooth and often two or three other teeth toward the apex may be somewhat longer and more acute than their fellows.

Form of the head somewhat different from that of *Smithistruma* s. str., the occipital lobes seen from the front merging gradually and evenly with the anterior part of the head, less suddenly and strongly expanded laterally. Mesoepinotal region usually with a depression or constriction. Sculpture and spongiform appendages rather uniformly developed, much as in *Smithistruma* s. str. Most hairs clavate, of varying length.

SUBGENOTYPE: *Strumigenys simoni* Emery, 1895, Ann. Soc. Ent. France, LXIII, p. 42, Pl. 2, fig. 21, worker. (By present designation.)

This subgenus includes more than twenty forms peculiar to the Ethiopian region. Certain species of *Smithistruma* s. str. from the New World tropics and from the Indomalayan region approach *Serrastruma* in the length of the mandibles and in having the region of the mesoepinotal suture constricted. Since certain of these species, as well as many *Serrastruma,* have not yet been thoroughly investigated as regards mandibular characters, *Serrastruma* is left for the present as a subordinate subgenus to *Smithistruma.* The relationships of the species and subspecies within the subgenus are in considerable confusion and require review.

STRUMIGENYS Fred. Smith

1860. *Strumigenys* Fred. Smith, Journ. Ent., I, p. 72, Pl. IV, figs. 6–11.
1876. *Orectognathus* Fred. Smith, Trans. Ent. Soc. London, p. 491, part.

Mandibles linear, elongate, each armed at the apex with a pair of spiniform teeth which we may term the apical fork. These teeth are bent sharply inward and together determine a plane which lies at or nearly at a right angle to the shaft of the mandible. There may be included between the tines of the fork one or more smaller teeth or denticles. In addition, the inner mandibular border often bears, usually toward the apex, one, two, or three separated spiniform teeth or one or two reduced and denticuliform teeth, or a series of up to eight minute, separated denticulae. A basal tooth probably homologous to those of *Epopostruma* Forel, *Orectognathus* Fred. Smith, etc. often occurs in a very much reduced form on or adjacent to the condylar processes at the insertion of the mandible; this tooth is often slender and directed backwards when evident, and is usually not visible when the mandibles are closed. The proximity of the basal tooth to the condylar masses precludes the development of a distinct basal border homologous to that of *Smithistruma* or *Trichoscapa* Emery, and even when the mandible is fully separated from the head, the vestige of this border is not distinct.

The clypeus is always much shorter than the mandibles; the anterior clypeal apron projects anteriorly little or not at all, covering only a small portion of the bases of the mandibles. The mandibles vary in length from more than one quarter to one and one quarter times the length of the head proper, according to species.

The head proper is generally depressed pyriform, narrowest anteriorly and with more or less excised posterior border. Eyes small to medium-sized, placed in or below the grooves which receive the antennae when the latter are folded in. The antennal scape often incrassate and sometimes bent, the second and third funicular joints reduced and the apical joint very long. The entire antenna is relatively longer and more slender than in genera with shorter mandibles; in fact, the length of the antennae in the higher dacetines

may be said to vary in general in rough proportion to the exposed length of the mandibles.

Epinotum furnished with spines, upright lamellae, or both. Petiole and postpetiole commonly with rather abundantly developed spongiform appendages.

Sculpture of the body, except parts of the gaster, and sometimes the nodes of petiole and postpetiole, and thoracic pleurae, reticulate or granulate and opaque, sometimes with very feeble rugulae or carinulae on head and dorsum of thorax respectively. Most often, the major portion of the gaster is smooth and shining, sometimes along with varying areas of the nodes and thoracic-epinotal pleurae. The base of the gaster usually with fine longitudinal striae radiating from the juncture with the postpetiole. Rarely, the greater part of the dorsum of the gaster is reticulate or striate and opaque.

Hairs usually abundant, clavate, squamate or simple, sometimes very long and slender, especially on the posterior parts of the body. Small to medium-sized ants ranging in color from yellowish to blackish, but usually light to dark ferrugineous.

GENOTYPE: *Strumigenys mandibularis* Fred. Smith, 1860, Journ. Ent., I, p. 71, Pl. IV, figs. 6, 8, 10, female, *nec* worker, monobasic.

With the removal of several groups, discussed elsewhere in this paper, the genus *Strumigenys* still remains a very large and heterogeneous group. Further investigation will undoubtedly show that the genus divides into a number of natural subgenera. Only two divisions may be recognized with any certainty at present; these are discussed below.

The genus as here constituted remains as probably the best known and most typical of the dacetine genera. The species are distributed throughout the tropics and warm temperate regions of the world, with the only apparent exception being the Mediterranean region. Several species, such as *rogeri* Emery and *godefjroyi* Mayr and its subspecies, are becoming widespread through insular and littoral areas within the tropics due to dissemination by commerce.

Strumigenys Fred. Smith *sensu stricto*

Includes the majority of the species, including all those originally native to the old world. Distinguished from the subgenus *Pyramica* Roger by having long, equal or subequal apical teeth. Both of these teeth making up the apical fork are usually distinctly longer than the distance between the inner borders of the closed mandibles measured along the anterior clypeal border. Some

members of the *louisianae* group of this subgenus have the ventral tooth of the apical fork somewhat shorter than the dorsal, but these differ from *Pyramica* in having a single short spiniform preapical tooth and, rarely, an additional minute denticle near the midlength of the inner mandibular border.

SUBGENOTYPE: same as for the genus.

Pyramica Roger

This subgenus includes the neotropical species related to *eggersi* Emery, which is perhaps the best known form. Perhaps the best distinguishing character lies in the combination of short apical fork, the ventralmost of the large teeth being distinctly shorter in most species than the dorsal, with a more or less wide spacing of the mandibles at their point of emergence from under the anterior clypeal border. This character is most satisfactorily brought out by comparing the length of the ventral tooth of the apical pair with the distance between the inner borders of the closed mandibles at the level of the anterior clypeal border. All true *Pyramica* have the ventral tooth shorter than this space, though a few forms have the tooth almost as long.

As subsidiary characters may be mentioned the convex inner mandibular border; the preapical series of minute denticles, three to eight in number; the broad, transversely ovate postpetiolar node; the absence or relatively slight development of the spongiform masses on both petiole and postpetiole, and the very small size. A few species lack one, more rarely two, of the above subsidiary characters. For example, in the species *denticulata* Mayr, the mandibles are rather strongly bowed outward, bringing about a concavity instead of a convexity of the inner borders; in *gundlachi* and several other forms, the denticulae are absent from the inner mandibular border; and in more than one undescribed form, the denticulae are replaced by two or three short, triangular teeth.

SUBGENOTYPE: *Pyramica gundlachi* Roger, 1862, Berl. Ext. Zeitschr., VI, pp. 251–254, Pl. 1, fig. 18b, worker *nec* female.

Although I have not seen specimens of *gundlachi,* Roger's description and figures seem to place it in the same group with *eggersi.* Indeed, it may be exactly the same ant as one of the forms of *eggersi* such as *cubaensis* Mann, or, more likely, *banillen-*

sis Santschi. Besides the species mentioned, the subgenus contains the species *bierigi* Santschi and the three related species *clavata* Weber, *subedentata* Mayr, and *tristani* Menozzi. The revision planned for this group will modify the arrangements among specific and subspecific groups considerably and add several new forms. If *gundlachi* proves to be a *Strumigenys* s. str., a new subgeneric name will have to be proposed for this group, which ranges throughout the neotropical area.

NEOSTRUMA new genus

1887. *Strumigenys* Fred. Smith, 1860, *sensu* Mayr, part. Verh. Zool. bot. Ges., Wien, XXXVII, p. 567, et suiv.

Forms closest to *Strumigenys* (*Pyramica*), but having the teeth of the apical fork even more reduced and equal or subequal and the space between the inner borders of the mandibles at their bases even wider; the apical teeth in length equaling less than half this distance; mandibles converging markedly, one-third to one-half the length of the head proper. The preapical armament consists of a *subapical* series of minute, separated denticulae followed at or just distad of the midlength of the exposed mandibular shaft by a somewhat longer acute tooth, which is in turn followed proximally by a short series of denticles which we shall here term the *proximapical* series. Each of these two series of denticles may consist, according to species, of three to six units. Proximad of the proximapical series, the inner mandibular border is unarmed for the relatively great distance to the anterior clypeal border and somewhat beyond, where the *basal tooth,* an erect, narrow lamina near to the basal condylar structures, is completely concealed. Basal border obsolete or indistinct, greatly reduced. The head as a whole generally more flattened dorsoventrally than in *Pyramica,* the antennae, especially the scapes, relatively short. Otherwise much as in *Pyramica.*

GENOTYPE: *Strumigenys crassicornis* Mayr, 1887, Verh. zool.-bot. Ges. Wien, XXXVII, pp. 577–578, worker, by present designation.

Includes also the neotropical species *mustelina* Weber, *brevicornis* Mann, and at least one other new species.

TINGIMYRMEX Mann

1926. *Strumigenys* (*Tingimyrmex*) Mann, Psyche, XXXIII, pp. 104–105, fig. 1, worker.

The highly developed lamelliform appendages of the head and thorax, peculiarly shaped petiole, aberrant mandibles and shining vertex set *T. mirabilis* off sharply from the genus *Strumigenys*

and from other dacetine genera. Mann gives a good description and figures in the reference mentioned. Considered here as a separate genus. Neotropical.

GENOTYPE: *Strumigenys* (*Tingimyrmex*) *mirabilis* Mann, 1926, Psyche, XXXIII, pp. 104–105, fig. 1, worker, monobasic.

TRICHOSCAPA Emery

1869. *Strumigenys* (*Trichoscapa*) Emery, Ann. Accad. Aspir. Nat. Napoli (2), II, p. 24, Pl. I, fig. 11, worker.

1922. *Strumigenys* (*Cephaloxys*) Fred. Smith, *sensu* Emery, subgeneric name preoccupied, part. Gen. Ins., Hymen., Fasc. 174, p. 324.

Head shorter and relatively broader than in *Smithistruma*. Mandibles, short, robust, triangular; the apical border forming a right angle with the exposed and horizontally (in the closed mandible) oriented basal border. Entire length of apical border closely set with acute serially arranged teeth, the basalmost tooth not differentiated or set off from the rest by a diastema. Eyes consisting of but a few facets.

Prothoracic dorsum flattened, with strongly marginate lateral borders meeting the marginate anterior border through distinct humeral angles. Epinotal declivity marked on each side with a prominent, erect translucent lamella. Petiole and postpetiole with abundant lamelliform-spongiform appendages.

Head densely and rather finely punctate and opaque, prothorax varying somewhat from shining to subopaque in specimens from various localities. Petiolar and postpetiolar nodes somewhat shining, as are varying areas of the thoracic and epinotal pleurae. The gaster smooth and shining, the first gastric segment with an extensive area on each side of the anterior dorsum finely longitudinally striate.

Prominent head hairs restricted to a pair of short, erect clavate hairs on the vertex; a series of prominent clavate hairs on the anterior border of the antennal scapes and a few of the same scattered toward the apex of the gaster. The thorax in the female has a few clavate hairs on the thoracic dorsum, and both worker and female have abundant subappressed clavate hairs on the legs, especially toward the tips.

Size small; color yellowish testaceous to medium ferrugineous.

GENOTYPE: *Strumigenys* (*Trichoscapa*) *membranifera* Emery, 1869, Ann. Acc. Aspir. Nat. Napoli, 2nd Era, II, pp. 24–25, Pl. 1, fig. 11, worker.

M. R. Smith has recently (1947) shown that the term *Cephaloxys* is preoccupied and not available to the Formicidae which have short mandibles but are otherwise much like *Strumigenys*. The next subgeneric name available, which Smith applied, was

Emery's *Trichoscapa*. The present view offered is that *membranifera*, the genotype of *Trichoscapa*, is quite distinct from the great majority of the short-mandibulate forms. With the separation of these groups, then, *membranifera* and allied forms must retain the name *Trichoscapa*. Except for the small size and ventrolateral position of the eyes, *Trichoscapa* seems more closely related to *Alistruma* new genus and other Australasian forms than to *Strumigenys* or *Smithistruma*. It is certainly distinct from all other dacetine genera I have seen.

In grouping together the forms which seemed to belong to *Trichoscapa*, I was struck by the very close similarity between the species, all of which were originally described as species of *Strumigenys*. There seemed to be no really constant differences among series from widely distant localities. A search of the collecting records for the various forms listed below revealed a strong tendency in the genus toward a littoral-insular type of distribution. Furthermore, the microhabitat in each case was often of a nature greatly suggestive of nesting sites of certain tropicopolitan species or tramps. Dacetini are not generally considered to be efficient tramp species, but specimens of numerous dacetine species taken in government plant quarantine sharply contradicts the idea. Dr. F. X. Williams took *Strumigenys rogeri* Emery, a common and presumably neotropical species, a number of years ago near Honolulu. I have identified this specimen from among a miscellaneous unidentified collection of Hawaiian ants in the Museum of Comparative Zoology. Dr. M. R. Smith has sent me a long series of *rogeri* taken at Honolulu recently, but this time in a shipment of plants from the Fijis! This indicates that *rogeri* is being spread rather rapidly throughout the Pacific area by commerce.

That Dr. Smith has taken *membranifera* in the United States in plant bulbs and in the timbers of old houses is strongly suggestive of a similar means of distribution. Dr. Smith has sent six specimens of *membranifera* from Guam, and I took a female in 1945 in a densely populated rice-raising area near Chengtu, Szechuan, in western China.

The following forms, given with the names used in the original descriptions, are considered to be slight variants of *T. membranifera* and synonymous with the latter:

Strumigenys membranifera race *simillima* Emery, 1890. (S. E. United States and West Indies.)
S. membranifera var. *santschii* Forel, 1904. (Tunisia.)
S. (*Cephaloxys*) *membranifera* var. *marioni* Wheeler, 1933. (S. E. United States.)
S. (*Cephaloxys*) *membranifera* var. *williamsi* Wheeler, 1933. (Hawaii.)
S. (*Cephaloxys*) *silvestriana* Wheeler, 1928. (China Coast.)
S. (*Cephaloxys*) *foochowensis* Wheeler, 1928. (China Coast.)
S. (*Cephaloxys*) *vitiensis* Mann, 1921. (Fiji Islands.)

There are very slight variations between the series from different localities, but none of these variations are great enough or constant enough even within one locality series to count as more than subspecific differences. The females from different places are utterly indistinguishable one from another; some, such as *foochowensis* Wheeler, were described through ignorance of the morphological relationships between worker and female and through overlooking such characters as the pair of clavate hairs on the vertex. As in the case of *simillima,* which Emery himself stated was so similar to the typical *membranifera* that he would not have considered it new had it been found in Europe instead of the New World, most of the forms were described on the basis of geographical isolation. If any forms are to retain their names as separate subspecies, *simillima* and *silvestriana* are probably the only two that deserve such rank on a morphological basis. These show very slight differences in pronotal width and degree of opacity of the integumental surface of the thorax, such as would be expected in small migrant populations temporarily isolated in a strange environment. Until larger series are available and until field studies of the proper scope may be undertaken, it would appear best to consider them all as very slight variants of the one species *membranifera,* without further nomenclatorial distinction. Males are rare if not unknown in collections; a study of the genitalia, such as has been started with other dacetine species available in the caste, might prove of value in this connection.

Genera with Six-jointed Antennae Belonging to the Neotropical Codiomyrmex-Glamyromyrmex Complex

CODIOMYRMEX Wheeler

1916. *Codiomyrmex* Wheeler, Bull. Mus. Comp. Zoology Harvard, LX, pp. 326–327, fig. 1.

1922. *Strumigenys* (*Codiomyrmex*) Wheeler, *sensu* Emery. Gen. Ins., Hymen., Fasc. 174, p. 326.

The peculiar conservatism with respect to genera and subgenera in the *Dacetini* which has been adhered to by former authors is nowhere illustrated more clearly than in the case of this genus, which, subsequent to its original description, was lowered by several authors to the rank of subgenus under *Strumigenys*. At the end of the original description, Wheeler states:

"I have made [*Codiomyrmex thaxteri*] the type of a distinct genus, though it is evidently much like a *Strumigenys* except in the structure of the head, because I believe that this latter genus is soon destined to suffer disintegration into a number of subgenera or genera. This fate has already overtaken several other ant-genera (*Camponotus, Formica, Crematogaster, Monomorium, Pheidole,* etc.) that have become unwieldy through accumulation of species which even a very conservative myrmecologist must regard as heterogeneous."

Codiomyrmex is here regarded, as in the original description, as a genus, though related to *Smithistruma* and *Glamyromyrmex*. It is distinguished from these genera by the combination of the relatively short cephalic length with the rugose sculpture of at least the upper portion of the dorsum of the head. The mandibles are triangular, robust, only moderately elongate, together with a very convex dorsal surface. Apical border serially dentate, the teeth adjacent and strongly developed individually. The axis upon which the mandibular teeth meet in the midline tilted somewhat ventrad anteriorly in relation to the main longitudinal axis of the head. Hairs fairly abundant, long and slender, none clavate. Size small, color medium- to blackish-ferrugineous.

GENOTYPE: *Codiomyrmex thaxteri* Wheeler, 1916, Bull. Mus. Comp. Zool. Harvard, LX, pp. 327–329, fig. 1, worker, monobasic.

After the original description, three quite diverse neotropical ants were further assigned to *Codiomyrmex*. Of these, *C. nitens* Santschi is herein made the type (see below) of a new genus; *C. convexiceps* Santschi is transferred to *Glamyromyrmex;* and *C. excisus* Weber is provisionally retained in *Codiomyrmex*. The genus is exclusively neotropical.

GLAMYROMYRMEX Wheeler

1915. *Glamyromyrmex* Wheeler, Bull. Mus. Comp. Zool. Harvard, LIX, pp. 487–488, fig. 2.

1931. *Strumigenys* (*Codiomyrmex*) Wheeler, 1916, *sensu* Santschi, part. Rev. de Ent., I, p. 277.

Related to *Codiomyrmex,* from which it differs in details of head shape, mandibles, sculpture and pilosity. Sides of head only moderately converging anteriorly, posterior excision slight to moderate. Mandible short, subtriangular; apical and basal borders distinct, the former with five to seven coarse, serially arranged teeth, which meet the dental series of the opposite mandible on an axis quite strongly divergent ventrally from the main longitudinal axis of the head proper. The clypeus broadly transverse, with anterior border straight to strongly emarginate or excised. The clypeus, together with the rest of the dorsum of the head, quite convex when seen from the side in profile. Body integument for the most part smooth, the sculpture of the head almost or quite completely effaced, the surface resulting nearly or completely smooth. Head hairs reduced to very short, fine appressed hairs, arising from sparsely distributed minute punctulae, rarely with a very few longer hairs standing more or less erectly on the extreme occipital region. Other body hairs sparse, long and attenuated. Size small; color light to dark ferrugineous.

GENOTYPE: *Glamyromyrmex beebei* Wheeler, 1915, Bull. Mus. Comp. Zool. Harvard, LIX, pp. 488–491, fig. 2, all castes, monobasic.

Neotropical; contains also the species *convexiceps* Santschi and *wheeleri* M. R. Smith.

DORISIDRIS new genus

1932. *Strumigenys* (*Codiomyrmex*) Wheeler, *sensu* Santschi, part. Rev. de Ent., II, p. 413.

Habitus intermediate between, perhaps, *Glamyromyrmex* and *Strumigenys,* with sculpture and head shape more as in the former, mandibles more as in the latter. Each mandible with a fork of two spiniform teeth at the apex of its long, sublinear-flattened arcuate blade. Preapical teeth separated, few (three in the genotype) in number, spiniform. As in *Glamyromyrmex* and *Codiomyrmex,* the antennae are rather short, and the spongiform appendages of both petiole and postpetiole are well-developed. Form and sculpture of the body in general that of *Glamyromyrmex,* the head with subparallel sides and transverse posterior border. Hairs on dorsum of head and body fine, quite reduced and inconspicuous on the anterior part of the head, longer on the vertex and occiput, and becoming longer and longer posteriorly on the body, longest on the gaster. Size small. (Description adapted from text and figures of Santschi, 1932.)

GENOTYPE: *Strumigenys* (*Codiomyrmex*) *nitens* Santschi, 1932, Rev. de Ent., II, pp. 413–414, fig. 2, worker, by present designation, monobasic.

The only known species is *D. nitens* from Cuba. The genus is named for my wife, Doris Evelyn Brown.

Genera with Six-jointed Antennae, Formerly Included in the Australasian Genus Epopostruma Forel

ALISTRUMA new genus

1897. *Epopostruma* Forel, *sensu* Emery, part. Term. Füzetek, XX, p. 573.

Includes the species with well-developed lamellate lateral wings or lobes on *both* petiolar and postpetiolar nodes. The mandibles triangular, their apical borders distinct from the basal and meeting the latter at approximately right angles. Apical borders denticulate their entire length, each with one or two teeth at the apex slightly more prominent than the rest of the series, but not arranged in a typical apical fork. Eyes rather large, placed laterally above the position of the antennal scapes when the latter are retracted against the sides of the head. Sculpture of most of body and head opaque, densely and finely punctate or granulate or with small rugulae, the gaster smooth and shining, with fine striae running longitudinally at the base of the first gastric segment. Size moderate; color yellowish testaceous to deep brown.

GENOTYPE: *Epopostruma foliacea* Emery, 1897, Term. Füzetek, XX, pp. 573–574, Pl. 15, figs. 20–21, worker, by present designation.

This genus, which may be distinguished by the *distinctly separated* third, fourth and fifth flagellar joints of the antennae from the related genus *Clarkistruma* new genus, is found in Australia and New Guinea. Nothing has been reported on its habits, which should prove of considerable interest in connection with the specialized mandibular type. Named for the peculiar alate lamellae springing laterally from the petiole and postpetiole. Includes, besides the type, the species *froggatti* Forel and one or more undescribed species which I am now studying.

COLOBOSTRUMA Wheeler

1927. *Epopostruma* (*Colobostruma*) Wheeler, Quart. Rev. Biol., II, p. 32, fig. 40, female.

This genus, which Wheeler figured but did not adequately describe in the original reference, is closely allied to the genus *Alistruma* as described above. It differs from *Alistruma* in the shape of the head, which is obliquely truncate from near the level of the ocelli forward, the flat truncate part including in its plane the mandibles, clypeus, and much of the vertex. The description is that of a single specimen in the collection of the Museum of Comparative Zoology. This is a female which does not seem to agree very well with any Australian dacetine worker in the quite complete series of forms from that continent which is presently at my disposal. The color is testaceous yellow with a brown transverse band of rather indefinite limits across the gaster, a color pattern often found in ants inhabiting hollow twigs or other plant cavities (*Leptothorax, Pseudomyrma,* etc.). Wheeler supposed this ant to have habits somewhat like those of *Colobopsis*. There are, however, no observations known to me which support this view.

GENOTYPE: *Epopostruma* (*Colobostruma*) *leae* Wheeler, 1927, Quart. Rev. Biol., II, p. 32, fig. 40, female, monobasic.

Known only from the type specimen, which was collected by A. M. Lea in the Cairns district of Queensland.

I have not been able to find any references to either the genus or its type in print, including the usual compilations of zoological names, other than the original reference, to which Mr. John Clark kindly called my attention, and a reprint of the figure in Prof. Wheeler's book, "Foibles of Insect and Man." Mr. Clark has ventured the opinion in a letter that this form should be regarded as representing a distinct genus, and I concur in this.

MESOSTRUMA new genus

1895. *Strumigenys* (*Epopostruma*) Forel, Ann. Soc. Ent. Belg., XXXIX, p. 422.

1897. *Epopostruma* Forel, *sensu* Emery, part. Term. Füzetek, XX, p. 573.

Intermediate in character between *Alistruma* and *Epopostruma* as the latter genus is considered below. The postpetiole has lateral lamelliform alae, but

these are lacking on the petiole. The shape of the mandible is also intermediate in having the basal spine so characteristic of the true *Epopostruma,* but with this structure overlain by a thin semitransparent lamella which fills out the outline of the mandible to a narrow edition of that of *Alistruma* and provides differentiated apical and basal borders. The basal spine is clearly visible through the lamellate structure and is seen to run obliquely backward and inward, with its apex at the (approximately right) angle between the basal and apical borders. Apical border cultrate, with a prominent tooth at its apex and a shorter tooth adjacent to the apical one.

Neither the posterior excision of the head nor the lateral expansion of the occipital lobes nearly so well developed as in *Epopostruma,* but the sculpture, especially of the head, consists of prominent, separated shallow punctures much the same as those of the latter genus.

GENOTYPE: *Strumigenys* (*Epopostruma*) *turneri* Forel, 1895, Bull. Soc. Ent. Belg., XXXIX, p. 424.

Epopostruma monstrosa Viehmeyer, described from an individual displaying marked right-left asymmetry and thus probably gynandromorphic or otherwise anomalous, may belong here. Mr. Clark has sent another species belonging to this genus which is apparently new. The genus is restricted to Australia and Tasmania as presently known.

EPOPOSTRUMA Forel

1895. *Strumigenys* (*Epopostruma*) Forel, Ann. Soc. Ent. Belg., XXXIX, p. 422.

1897. *Epopostruma* Forel, *sensu* Emery, part. Term. Füzetek, XX, p. 573.

Includes the species with mandibles much as in *Strumigenys;* these structures long, linear and flattened, with a typical apical fork consisting of two stout, spiniform equal or subequal teeth, and a long, spiniform basal tooth directed inward and backward and situated so as to be practically completely covered by the clypeus. Petiole and postpetiole without prominent lateral lamellate alae, though the postpetiole may show the merest vestiges of lateral teeth. Two short pairs of spines, one pair on the humeri directed upward and outward, and one pair on the dorsum of the petiolar node; also a pair of long spines, diverging and somewhat dorsally directed, on the epinotum.

The sculpture consisting of numerous punctures in the generally smooth and shining integument except on the gaster which is usually rather smooth over most of its surface, with perhaps an area of rather obscure striation near its base. The punctures vary with the species from rather small, scattered piligerous pits to large, round, shallow umbilicate foveolae which are crowded and often touching each other. Hairs short, erect, rather abundant and evenly distributed over the body.

The general head shapes in this and the following genus are much alike and resemble that of *Daceton* Perty, *Strumigenys*, *Orectognathus* and other allied genera, but *Epopostruma* has the head of both female and worker longer, if only slightly, than broad; *Hexadaceton* new genus has the head distinctly broader than long.

GENOTYPE: *Strumigenys* (*Epopostruma*) *quadrispinosa* Forel, 1895, Bull. Soc. Ent. Belg., XXXIX, p. 422, worker; by designation of Wheeler, 1911.

Contains also the species *ferruginea* Forel, which has been considered a subspecies of *quadrispinosa* heretofore, plus two or more undescribed forms. The genus is found in Australia and Tasmania.

HEXADACETON new genus (fig. 2)

Has the characters of *Epopostruma* as described above, but differs in the following respects:

1. The head broader than long, with a very broad posterior excision and occipital lobes evenly rounded behind.
2. There is a prominent tooth springing from the side of the head just behind each eye.
3. The spines on the body, particularly the pairs on the humeri and on the dorsum of the petiole, much longer than in the preceding genus and more evenly tapered to their rather acute apices.
4. The postpetiole on *each side* continued laterally into a prominent pair of dorso-ventrally flattened teeth or spines, the bases of which are connected by a ridge.
5. Mandibles broader than those of the preceding genus.
6. Body generally decidedly larger and more robust than in *Epopostruma*.

GENOTYPE: *Hexadaceton frosti* new species (described below).

Hexadaceton frosti new species (Text-fig. 2.)

Worker.—Total length, including mandibles, $5.4 \pm .1$ mm. Maximum lengths of sections as follows: head, excluding mandibles, $1.20 \pm .01$ mm.; closed mandibles, exposed portion, $0.60 \pm .01$ mm.; thorax (Weber's measurement), $1.35 \pm .02$ mm.; antennal scape, $0.73 \pm .01$ mm.

Indices, given as percentages of maximum length of the head proper, as follows: Cephalic (greatest width to greatest length), 107 ± 1; mandibulocephalic (exposed length of mandibles to length of head proper), 50 ± 1.

Head with a very broad, deep posterior excision and expanded occipital lobes. Eyes large, strongly convex, situated near the midlength of the head astride the ridges which mark the dorsal borders of the antennal scrobes, about half their lengths anterior to a flat, triangular tooth which projects

laterally from the dorso-lateral margin on each side. Scrobes broad and shallow, only weakly demarcated ventrally behind. Cheeks just posterior to the level of the antennal insertions each with a massive, blunt-tipped lateral subconical process, immediately behind which is a narrow cleft running dorsally to become confluent with the scrobe. Frontal area triangular, slightly impressed relative to the moderately convex vertex. Clypeus broadly subtriangular, with posterior lobe truncate above, the anterior clypeal border broadly and extremely shallowly emarginate. Mandibles rather broad and robust compared to *Epopostruma* spp., their inner margins with dorsal and

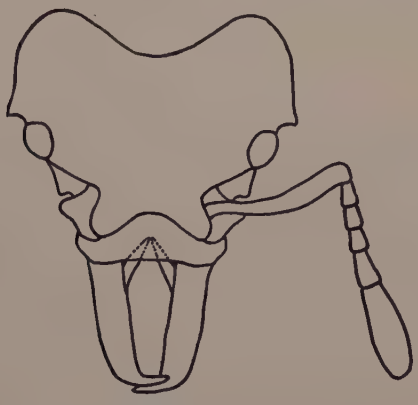

Fig. 2.—*Hexadaceton frosti* new genus and species, worker. Outline of dorsal aspect of head. "N. Mecklenburg," South Australia.

ventral borders without traces of denticulation; the apical fork of two thick, rather blunt teeth converging in a narrow V without intercalary denticulation. Antennal scapes gently but distinctly curved toward their middles and becoming incrassate at the middles and continuing so on toward the tips; funicular joints five in number, the apical joint longer than the three preceding joints together, the three basal joints subequal, the fourth slightly longer and more massive than any of the first three.

Thoracic dorsum evenly convex in profile, its sutures obliterated by the rough sculpture. Humeral and epinotal spines long, straight and acute, the latter longest. Each epinotal spine subtended below by a very low vertical carina, which widens below into an erect subangular translucent lamella which guards its own side of the rather steep, weakly concave epinotal declivity.

Pedicel of petiole rather long, its dorsum sloping gradually to the apex of the node; posterior dorsal declivity of node sloping more sharply behind. Spines on dorsum of petiolar node long, acute, directed upwards and outwards and curved slightly toward the posterior, almost or quite as long as the distance between their bases. Postpetiole much broader than the petiole,

the dorsal surface evenly convex; each side with two broad, flat acute teeth projecting laterally and deflected somewhat posteriorly; the anterior of the two longer, thicker and deflected dorsally; the posterior broad, lamelliform, translucent, only weakly deflected dorsally.

Sculpture of the coarser type mentioned above in the description of *Epopostruma*, with large, round, shallow, often contingent foveolae, mostly umbilicate, covering the greater part of the head, thorax, petiole and postpetiole. The spaces between the foveolae tend to form ridges in the more densely crowded areas, but are plane and smooth and shining in less densely punctured places. The bottoms of the foveolae and the frontal area, clypeus, mandibles, legs, antennae and gaster are also smooth and shining. The gaster displays a series of very short longitudinal striae in the constriction at its juncture with the postpetiole, and very fine, scattered punctures become evident on its general surface at higher magnifications.

Hairs fairly abundant, rather weak but erect, uniformly distributed over the entire dorsal surface of the body; many appear weakly clavate or truncate at their tips. Color clear medium honey yellow.

Described from the holotype alone (Museum of Comparative Zoology, No. 27838). This specimen was found among miscellany in the Wheeler Collection labelled with two different generic names apparently representing stages of Professor Wheeler's opinion of the generic placement. Since the specimen lacks a type label, and since no reference mentioning either name used has been found in the literature, the name *Hexadaceton* is here proposed as a totally new name for the apparently undescribed genus.

The locality labelling is "N. Mecklenburg, South Australia," and the collector's name is not fully legible.

The species is named for Dr. Stuart W. Frost, my former teacher in entomology, whose patient tutelage and infectious enthusiasm inspired and encouraged me in my work throughout my undergraduate years.

Genera with Four-jointed Antennae Formerly Included in Epitritus Emery and Epopostruma Forel

EPITRITUS Emery

1869. *Epitritus* Emery, Bull. Soc. Ent. Ital., 1, p. 136, fig. 1.

Small ants with prominent, slender, sublinear mandibles and bent or strongly incrassate antennal scapes. Apex of each mandible with one to four spiniform teeth plus one or more subapical denticulae. Other than these characters and the four-jointed condition of the antennae, there is little to distinguish the genus from other dacetines, especially from *Smithistruma* (*Wessonistruma*) and certain small *Strumigenys*.

GENOTYPE: *Epitritus argiolus* Emery, 1869, Bull. Soc. Ent. Ital., I, pp. 136–137, fig. 1, female, monobasic.

Includes, besides the genotype, the species *clypeatus* Szabo, *emmae* Emery, *eurycerus* Emery, *wheeleri* Donisthorpe and forms infraspecific to these. The genus is widespread but uncommonly collected throughout the tropical and subtropical regions of the globe. Evidence indicates that at least one form acts as a tramp, and the revision of the species with this probability in mind will bring about the synonymy of certain forms described more on the basis of geographical isolation than on morphological differences.

MICCOSTRUMA new genus

1909. *Epitritus* Emery, *sensu* Szabo. Arch. Zool. Budapest, I (7).

Small forms resembling *Smithistruma* superficially, characterized by the extremely small mandibles, which are one-third or less the length, considering only the normally exposed portions, of the clypeus. The mandibles are porrect, narrowly triangular, their apical or inner borders with serially arranged denticulae or spiniform teeth of varying lengths.

GENOTYPE: *Epitritus mandibularis* Szabo, 1909, Arch. Zool. Budapest, I (7): 1–2, fig. 2, worker, by present designation.

The genus includes only the genotype and *M. marginatus,* which Santschi described as an *Epitritus* in 1914; both species are from the Ethiopian Region. The generic name refers to the small size of the mandibles in particular and of the insects in general.

CODIOXENUS Santschi

1931. *Epitritus* (*Codioxenus*) Santschi, Rev. de Ent., I, p. 278, figs. 11, 12, worker.

The head oblong in shape, with posterior border only very weakly excised and the sides subparallel. Mandibles subtriangular, rather short and robust, with serial dentition. Head and body smooth and shining, the former especially with fine scattered punctures. Pilosity of head reduced, fine. Bears a strong superficial resemblance to *Glamyromyrmex convexiceps,* with which the only known specimens were mixed in the collector's vial.

GENOTYPE: *Epitritus* (*Codioxenus*) *simulans* Santschi, 1931, Rev. de Ent., I, pp. 278–279, figs. 11 and 12, worker, monobasic.

This peculiar genus, of which only the type species from Cuba is known, was supposed by Santschi to bear a parasitic or symbiotic relationship to the *Glamyromyrmex* with which it was apparently taken. Neither species has been reported since.

CLARKISTRUMA new genus

1913. *Epopostruma* Forel, *sensu* Forel, part. Bull. Soc. Vaud. Sci. Nat., XLIX, p. 179.
1928. *Epitritus* Emery, *sensu* Clark, part. Vict. Naturalist, XLV (Suppl.), p. 42.

Very similar to *Alistruma,* from which it differs principally in having only four antennal joints. The size of the specimens I have seen is also somewhat smaller than that of *Alistruma* species, though the difference is not great enough to be of real importance. Forel imagined that his *Epopostruma alinodis* showed vestigial sutures separating the third, fourth and fifth funicular joints one from the other, but a long series of cotypes from both Mr. Clark's collection and from that of the Museum of Comparative Zoology shows either no trace of division whatsoever or, in certain specimens, the very merest thinning at what might be considered the points of juncture of the antennal segments in question. Mounting of several antennae and examination by means of compound microscope showed only that joints three to five were solidly fused without traces of definite sutures or lines of juncture. Clark's *elliotti,* originally described as an *Epitritus,* has this same fusion joint, but in a greatly fore-shortened condition. In all *Alistruma,* the separations between the funicular joints in question are quite clear and seem to confer complete flexibility upon their section of the antennal body.

GENOTYPE: *Epopostruma alinodis* Forel, 1913, Bull. Soc. Vaud. Sci. Nat., XLIX, pp. 179–182, Pl. 1, figs. 1, 2, worker, by present designation.

Alinodis and *elliotti,* both Australian-Tasmanian species, are the only described forms, but series from several localities, sent from Australia by Mr. Clark may prove to be representative of new species or subspecies.

I take great pleasure in naming this genus in honor of Mr. John Clark, the eminent and able Australian entomologist, whose most generous loans and sound advice have played a major part in the revision of the Australian *Dacetini.*

Artificial Key to the Genera and Subgenera of the Dacetini, Based on the Workers

1. Antennal joints 12 (Neotropical).....**Basiceros** Schulz
   Antennal joints 11.....2
   Antennal joints 10 (Sicilian Amber).....**Hypopomyrmex** Emery
   Antennal joints 8 (Neotropical).....**Octostruma** Forel
   Antennal joints 7.....4
   Antennal joints 6.....7
   Antennal joints 5.....26
   Antennal joints 4.....27
2. Mandibles less than ½ length of head proper, serially dentate (Australia).....**Peronomyrmex** Viehmeyer
   Mandibles more than ½ length of head proper, linear, each with an apical fork and a basal spine.....3
3. Prothorax and petiole with prominent spines; size large; mandibles shorter than head proper (Neotropical).....**Daceton** Perty
   Anterior portion of thorax and petiole without spines; size small; mandibles very slender, about as long as head proper (Neotropical).....**Acanthognathus** Mayr
4. Eyes lacking; mandible with an apical fork of two large, acute teeth, inner border straight along proximal section (Cuba).
   Heptastruma Weber
   Eyes present, often minute; mandibles not as above.....5
5. Mandible short, broad, triangular or subtriangular, the well-differentiated apical border serially dentate or denticulate its entire length (Neotropical, Indo-Malayan, Papuan).....**Rhopalothrix** Mayr
   Mandibles linear or sublinear, curved, meeting only near their apices, their dentition modified and apical or subapical in position.....6
6. Mandible with a very long, sharp spine arising just proximad of the apex (Neotropical).....**Acanthidris** Weber
   Mandible with a small series of short, irregular teeth at its apex (Neotropical).....**Talaridris** Weber
7. Antennal scrobes absent; eyes dorso-laterally situated; two prominent teeth on each occipital lobe (Ethiopian).
   Microdaceton Santschi
   Antennal scrobes present.....8
8. Lateral and posterior borders of head with a completely continuous broad translucent fringe or plate of chitinous material; mandibles short-subtriangular, their apical borders minutely denticulate (Neotropical).....**Tingimyrmex** Mann
   Head without a fringe of translucent lamella, or at least not with one continuous posteriorly.....9
9. Eyes large, placed on or above dorsal borders of antennal scrobes..10
   Eyes large or small, placed near or beneath ventral borders of antennal scrobes.....14

10. Both petiole and postpetiole with lateral alar processes well developed; mandibles triangular.....11
Petiole without prominent lateral processes; mandibles variable...12
11. Head (only female known) obliquely truncate anteriorly, somewhat as in the formicine genus *Colobopsis* Mayr (Australia).
Colobostruma Wheeler
Head gently convex dorsally; not truncate anteriorly (Australia, Papua).....**Alistruma** new genus
12. Postpetiole with only vestiges of lateral processes; mandibles long, linear, with apical fork (Australia).....**Epopostruma** Forel
Postpetiole with *prominent* laterally projecting teeth or lamelliform structures.....13
13. Postpetiole with two stout, flattened teeth projecting laterally on each side; basal tooth of mandible free, but mostly hidden beneath clypeal border (Australia).....**Hexadaceton** new genus
Postpetiole with a rounded lamelliform ala on each lateral border; basal tooth of mandible enclosed in a flat, semitransparent lamella (Australia).....**Mesostruma** new genus
14. Mandible elongate, linear or sublinear, with a well-differentiated apical fork of two inwardly directed spiniform teeth, which sometimes have one or more smaller teeth or tubercles between them; *prominent* spiniform teeth either lacking or less than four in number; basal mandibular border poorly developed or obsolete..15
Mandible most often not strikingly elongate, subtriangular or triangular, without a differentiated apical fork, its apical border serially dentate or denticulate, rarely edentate, well differentiated from the basal border, though the latter is often hidden beneath the clypeus.....20
15. Head in dorsal view oblong, with subparallel sides and slightly convex posterior border; mandible broad at base, with three prominent preapical teeth; integument smooth (Cuba).
Dorisidris new genus
Head in dorsal view strongly narrowed anteriorly and with emarginate or excised posterior border; at least the dorsum of the head largely sculptured and opaque.....16
16. Blade of mandible less than ⅓ length of head proper (fig. 1), quite broad near the anterior clypeal border, its external margin turning sharply inward just anterior to the insertion; internal margin with a large, lobe-like basal process which is normally mostly hidden by the clypeus (Indo-Malayan, Australian, Papuan).
Labidogenys Roger
Blade of mandible linear, with the external and internal borders of at least the basal half nearly or quite parallel, exposed portion of mandible usually ⅓ or more of the length of the head proper, basal tooth reduced or dentiform.....17

17. The two principal teeth of the apical fork both reduced, nearly or quite equal in size; preapical armature consisting of a small spiniform tooth at or just distad of the midlength of the blade, flanked distally and proximally by short series of minute, separated denticulae (Neotropical).....**Neostruma** new genus

    At least one tooth of the apical pair prominent and elongate; preapical armature not as above....**Strumigenys** Fred. Smith.....18

18. Two principal teeth of apical fork long, nearly or quite equal in length, the ventral tooth decidedly longer than the space between the inner borders of the closed mandibles at the level of the anterior clypeal border (Cosmopolitan).....most **Strumigenys** s. str.

    Ventral principal tooth of apical fork shorter than its dorsal mate, usually distinctly shorter than the space between the inner borders of the closed mandibles at the level of the anterior clypeal border.....19

19. Preapical armature absent or consisting of a short series of minute, separated denticulae or two or three large teeth (Neotropical). **Strumigenys (Pyramica)** Roger

    Preapical armature consisting of one preapical spiniform tooth, rarely with an additional minute denticle near the midlength of the inner border (Neotropical).
    some members of the *louisianae* group of **Strumigenys** s. str.

20. Head not strikingly elongate; cephalic hairs reduced and inconspicuous except, in some cases, for a very few on the extreme posterior dorsum of the head which may be larger; clypeus never with bizarre and prominent scales or hairs.....21

    Head elongate or not; cephalic hairs abundant, conspicuous, often clavate or otherwise bizarre; clypeus, at least the anterior border, with bizarre scales or hairs prominently displayed.....22

21. Head densely and finely sculptured, opaque; vertex with a single pair of short, erect clavate hairs; pronotum strongly margined anteriorly and laterally (World tropics and subtropics). **Trichoscapa** Emery

    Sculpture of head almost or quite effaced and smooth; prominent cephalic hairs completely absent or not as above; pronotum not strongly margined (Neotropical).....**Glamyromyrmex** Wheeler

22. Head distinctly rugose on at least the posterior dorsum.....23

    Head very finely and densely sculptured, appearing evenly granulate over its whole posterior dorsal surface.....24

23. Head markedly elongate; hairs on clypeus small, flattened and scale-like (Formosa)..**Smithistruma (Weberistruma)** new subgenus

    Head not strongly elongate; clypeal hairs not scale-like (Neotropical).....**Codiomyrmex** Wheeler

24. Apical border of mandible with a series of minute denticulae, twenty or more in number, the basalmost tooth of the series not or only very weakly differentiated as a "basal tooth"; the denticulation rarely so reduced as to make the apical border practically edentate (Ethiopian)..**Smithistruma (Serrastruma)** new subgenus

Apical border of mandible set with a linear series of less than twenty small, rather uneven teeth; the basalmost tooth differentiated from the rest as a spine-like tooth or plate-like lamella, often separated from the remainder of the series by a diastema and sometimes hidden beneath the anterior clypeal border.....25

25. Basal tooth wholly exposed when mandibles are closed, set off from the apical series by a diastema almost or more than equalling the length of the space occupied by the apical series (Nearctic). **Smithistruma (Wessonistruma)** new subgenus

Basal tooth exposed or covered when mandibles are closed, not set off by a diastema from the apical series, or the diastema much shorter than the space occupied by the apical series (Cosmopolitan except the Australian, Antarctic, and colder parts of the Holarctic regions).....**Smithistruma** s. str. new subgenus

26. Size rather large; mandibles linear, with an apical fork (Australia, Papua, New Zealand and adjacent oceanic islands). **Orectognathus** Fred. Smith

Size small; mandibles short, subtriangular, serially dentate (Formosa).....**Pentastruma** Forel

27. Eyes placed on or above dorsal borders of antennal scrobes (Australian).....**Clarkistruma** new genus

Eyes placed near or below ventral borders of antennal scrobes...28

28. Mandibles linear, longer than clypeus (World tropics and subtropics).....**Epitritus** Emery

Mandibles narrowly subtriangular, exposed portion very small, less than ½ the length of the clypeus (Ethopian). **Miccostruma** new genus

Note.—After the bulk of this paper had been completed, there came to hand through the courtesy of Dr. M. R. Smith a paper by Signor Saverio Patrizi of Rome, Italy, in which was described a new genus belonging to the *Dacetini,* based on a new East African species, *Proscopomyrmex londianensis.* (Boll. Ist. Ent. Univ. Bologna, xv, pp. 294–296, figs. 1, 2, 1946, worker.) The very good description and figures show an ant very closely related to *Strumigenys,* from which Signor Patrizi separates his genus principally on the peculiar eye-notches of the head, along with a modification of the antennal scrobes. Several species of *Strumigenys* from the Old World tropics have modifications of the region about

the eyes which are at least superficially similar to those of the new genus, and it would seem somewhat premature to consider *londianensis* as generically separate on these grounds alone. Until a more extensive study may be made of the relationships among the Old World species of this group, however, it is perhaps best to let *Proscopomyrmex* stand, since it may be possible that some or all of the forms with eye-notches fall within a natural group deserving generic or subgeneric rank.

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THE AMERICAN SPECIES OF PLEUROPHORUS

(COLEOPTERA: SCARABAEIDAE)

BY O. L. CARTWRIGHT [1]

Clemson, South Carolina

PLEUROPHORUS Mulsant

Pleurophorus Mulsant, 1842, Histoire naturelle des Coléoptères de France, Lamellicornes, p. 312.—Horn, 1887, Trans. Amer. Ent. Soc., vol. XIV, p. 90.—Schmidt, 1922, Das Tierreiche, pars 45, Aphodiinae, pp. 469, 488. —Chapin, 1940, Proc. U.S.N.M., vol. 89, p. 7.

TYPE OF GENUS: *Scarabaeus caesus* Creutzer (by monotypy).

The genus *Pleurophorus,* which includes the smallest species of Scarabaeidae known, is placed along with *Psammodius, Rhyssemus,* and *Trichiorhyssemus* in the tribe Psammobiina of the subfamily Aphodiinae. American genera of the tribe Psammobiina have the head granulate and all except Pleurophorus have the sides and base of the pronotum ciliate or fimbriate. In *Pleurophorus* the pronotum is not fimbriate, the median longitudinal furrow of the pronotum is always evident at least in part, and all the species have in common a characteristic pattern of rather coarse pronotal punctures.

Before the present study was undertaken all of the smaller *Pleurophorus* found in the United States were determined as *parvulus* (Chev.), or more recently as *batesi* Arrow. G. H. Horn placed all specimens under *Psammodius nanus* (DeGeer); however, DeGeer's *Scarabaeus nanus* is listed by Schmidt as an *Ataenius* from Surinam. The distribution given by Horn indicates his series included at least two or more different species.

As recognized by the writer, *Pleurophorus* now includes a total of nine American species. One formerly accepted species has been transferred to *Saprosites* (*S. ventralis,* see Chapin, 1940,

[1] Technical Contribution No. 157 from the South Carolina Agricultural Experiment Station, Clemson, South Carolina.

Proc. U.S.N.M., vol. 89, p. 10), two are transferred from *Psammodius* to *Pleurophorus* (*P. micros* and *P. grundeli*), and five are new.

The genus *Pleurophorus,* possibly because of the small size of its species, is poorly represented in American collections of Coleoptera. Only 1033 specimens were found in the thirty-two museum, university, and private collections loaning material for examination. Specimens were so few and so scattered the study would have been impossible without the very generous cooperation and loan of material by individuals and institutions.[2]

By far the greater part of the specimens studied was collected in the United States; however, a very few were taken in Canada, and all available specimens from the West Indies, Mexico, Central and South America were examined. All are included in the following account.

In addition to those characters mentioned in the first paragraph, the various species all agree in having certain characters in common which may not be mentioned in the specific descriptions. Under moderate magnification the granules of the clypeus show one to three or more very fine punctures on their summits. Minute alutaceous sculpture is sometimes visible between the granules. The anterior femora have a marginal line only along the lower or anterior edge. The mesosternum appears opaque due to fine short recurved hair. The abdominal segments are shining, crenate in front, sparsely very minutely punctate and usually have one or sometimes two or three close coarse shallow punctures at extreme sides. The second segment is carinate at the middle.

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[2] The following loaned specimens from Museum collections: G. J. Arrow, British Museum, London, England; W. J. Brown, Canadian Museum, Ottawa, Canada; E. A. Chapin, United States National Museum; Nathan Banks, Museum of Comparative Zoölogy, Harvard; Henry Dybas, Chicago Museum of Natural History; M. A. Cazier, American Museum of Natural History, New York; E. C. Van Dyke, California Academy of Sciences; W. D. Pierce, Los Angeles Museum; M. W. Sanderson, Illinois Natural History Museum; J. N. Knull, Ohio State University; R. H. Beamer, Snow Museum, University of Kansas; Henry Dietrich, Cornell University; Ada L. Olson, University of Michigan; L. S. Dillon, The Reading Public Museum; and C. E. Mickle, University of Minnesota. Specimens from private collections were loaned by F. G. Werner, F. W. Nunenmacher, L. J. Bottimer, Mark Robinson, W. F. Turner, Joe Schuh, Borys Malkin, C. A. Frost, H. B. Leech, W. F. Barr, F. N. Young, A. T. McClay, L. W. Saylor, M. Y. Marshall, S. D. Hicks and Geo. P. MacKenzie. To all these and to anyone inadvertently omitted, I am grateful and extend thanks.

Key to American Pleurophorus

1. First joint of posterior tarsi noticeably longer than the combined length of 2nd and 3rd; pygidial setae two or four.....2
   First joint of posterior tarsi equal to, or shorter than, combined length of next two; pygidial setae six to twelve.....4
2. Species more than 2½ times as long as wide; two pygidial setae. **caesus** (Creutzer)
   Species not quite 2½ times as long as wide; four pygidial setae.....3
3. Posterior femoral line entire, plainly visible from beneath; dark colored species.....**caelicollis** n. sp.
   Posterior femoral line apparently absent, in reality entire and visible from rear along posterior edge; light colored species..**notialis** n. sp.
4. Vertex of head finely punctate; first posterior tarsal joint noticeably widened apically, nearly twice as wide as second joint; eroded areas of pygidium transversely continuous.....5
   Vertex with mixed fine and moderate punctures; first joint very little widened apically; eroded area of pygidium divided by a median longitudinal carina.....7
5. Larger species, 2.73 mm. or more in length; metasternum with a deep inverted L-shaped line midway each side....**grundeli** (Van Dyke)
   Smaller species, usually not over 2.5 mm. in length.....6
6. Metathorax with lateral triangular depression; strong deep anterior groove behind middle coxae; eastern U. S.....**atlanticus** n. sp.
   Metathorax with lateral area merely flattened or very slightly depressed; no anterior groove; western United States, Mexico, Central America.....**micros** (Bates)
7. Median longitudinal metathoracic line strong, complete; slightly smaller species; West Indies.....**parvulus** (Chevrolat)
   Median line obsolete anteriorly, posterior half strong and deep.....8
8. Posterior femoral line fine; sides of elytra darker; Southern U. S. to Argentina, South America.....**longulus** n. sp.
   Posterior femoral line strong, half length of femur; a sharply defined area in middle of metathorax distinctly flattened in reflected light; Colombia, South America.....**gregalis** n. sp.

Pleurophorus caesus (Creutzer)

Scarabaeus caesus Creutzer, 1796, in: Panzer, Fauna Ins. Germ., Heft 35, nr. 2.

Pleurophorus caesus Mulsant, 1842, Histoire naturelle des Coléoptères de France, Lamellicornes, p. 312.—Horn, 1887, Trans. Am. Ent. Soc., vol. XIV, p. 91.—Schmidt, 1922, Das Tierreich, pars 45, p. 489 (see this paper for additional bibliography).

Slender, elongate, subcylindrical, piceous black, shining, legs ferrugineous. Antennae pale rufotestaceous. Head moderately convex, clypeus verrucose, a low transverse finely punctate swelling across front, a few coarse punctures

across the occiput, otherwise smooth. Clypeus broadly emarginate at middle, obtusely angulate each side, sides weakly arcuate to feebly prominent genae, edge finely reflexed.

Pronotum one-fourth wider than long, anterior angles obtuse, sides feebly arcuate, hind angles broadly rounded, base arcuate, marginal line distinct; surface coarsely, irregularly, sparsely punctured, a smooth space laterally, a deep postapical groove from front angles almost to middle, a large round fovea at middle of lateral declivity sometimes divided into two smaller foveae, median longitudinal line basally impressed with coarse deep punctures.

Elytra slightly narrower and nearly three times as long as pronotum, sides parallel, striae deep, punctate, intervals slightly convex, smooth, crenate on inner border. Metasternum smooth with median longitudinal line deeply impressed, a deep inverted L-shaped line posteriorly midway each side, anteriorly a deep line extending from between, and just back of, middle coxae out to a coarsely sculptured area anteriorly at extreme sides.

Abdominal segments smooth, crenate in front, the second strongly carinate at middle. Pygidium with two moderately long fine setae. Anterior femur emarginate on lower edge forming two obtuse teeth. Posterior femur smooth, marginal line fine, entire; tibia slender, shorter than femur, long spur shorter than first tarsal joint; tarsus and tibia equal in length, first tarsal joint as long as next three. Male pygidium nearly twice as long as that of female, penultimate and terminal abdominal segments more noticeably shortened. Length 2.7 to 3.3 mm. Width 0.9 to 1.1 mm.

Type.—Location unknown to writer.

Type locality.—Vienna.

Material examined.—Two hundred and nine specimens from the following states and provinces: Quebec, Canada, New York, New Jersey, District of Columbia, Maryland, Virginia, Pennsylvania, Ohio, Illinois, Missouri, Wisconsin, South Dakota, Utah, Idaho, Oregon, and California. Label data show collection dates from April 9 to December 15 and every month between except November.

Pleurophorus caesus seems to be our only truly northern species, ranging from coast to coast north of latitude 37 degrees.

Pleurophorus caelicollis new species

Holotype male.—Oblong, slightly wider behind, convex, shining, piceous. Legs and under parts similarly colored. Antennae rufotestaceous. Head strongly convex; clypeus broadly shallowly emarginate at middle, rounded each side of emargination, edge narrowly reflexed, surface moderately verrucose, genae sharply rounded, nearly right angled, a sharply defined wide deep anteocular groove extending upward from the gena to well above the upper edge of the eyes, its upper end bent backward, occiput apparently smooth but with minute scattered punctures.

Pronotum convex, one-fourth wider than long, anterior angles obtuse, posterior angles broadly rounded, sides nearly straight and parallel, the postapical groove deep in the anterior angles, constricting the surface and causing the angles to appear explanate, the groove continued upward across the disc in a series of closely placed coarse punctures leaving a wide smooth finely punctate apical edge, a similarly smooth lateral area before the posterior angles, remainder of disc with numerous mixed very coarse and very fine scattered punctures; lateral foveae and longitudinal median line basally indicated by more or less confluent coarse punctures; lateral and basal marginal grooves deep and well defined.

Elytra one-third longer than wide, twice as long as pronotum, sides slightly divergent to beyond middle, striae strong and deep, not closely crenately punctate, intervals convex, smooth, with a median row of very fine punctures. Metasternum shining, very finely sparsely punctate, a deep median longitudinal line joining a deep sharply defined line between the middle coxae which curves back around the coxae and out to a rough area extending forward at the sides, posteriorly a similar curved line extends inward from the roughened area almost to the posterior coxae, the area within the curve being slightly depressed and finely alutaceous.

Abdominal segments coarsely crenate in front, shining, minutely punctate at middle, each with a coarse median puncture laterally at extreme edge, second segment carinate at middle. Pygidium about 2½ times as wide as long, the eroded area one-third as long as wide, four long fine pygidial setae. Front femur shining, groove only along anterior margin. Middle and posterior femora shining, minutely punctate, with deep entire posterior marginal groove completely visible from directly below. Posterior femur and tibia equal in length, tarsus seven-tenths as long. First joint of posterior tarsus only feebly widened apically, three times as long as the second; longer tibial spur reaching to middle of second joint. Length 2.5 mm., width 1 mm.

Allotype female.—Similar to male except that the pygidium is 2⅓ times as wide as long, the eroded area five times as wide as long. Length 2.6 mm., width 1.3 mm.

Holotype and allotype in United States National Museum. No. 58809.

Type locality.—Pickens County, South Carolina, on ridge at right of U. S. Highway 178 at North Carolina line. Holotype and allotype collected August 20, 1940, by O. L. Cartwright.

Paratypes.—Sixty-three specimens. Sixty from the type locality in a wash of dead leaves and sand along a mountain trail by O. Starnes and the writer. Two from the hillside above powder house near ranger's station, Brevard entrance, Pisgah Forest, North Carolina, May 13, 1941, and one from Clayton, Georgia, August 20, 1938, by the writer.

Paratypes will be placed in the collections of the British National Museum, Canadian National Museum, Museum of Comparative Zoölogy, Academy of Natural Sciences of Philadelphia, California Academy of Sciences, Chicago Natural History Museum, Cornell University, Ohio State University, and the private collections of Mark Robinson, and the writer.

Specimens show only slight variation. Frequently the median line of the metasternum is deeper posteriorly and the curved anterior metasternal line is not always completely connected with the roughened lateral area. All agree invariably in having four pygidial setae.

Pleurophorus notialis new species

Holotype male.—Oblong, slightly wider behind, convex, shining, rufotestaceous. Legs and under parts similarly colored. Antennae testaceous. Head strongly convex; clypeus broadly moderately deeply emarginate at middle, rounded each side of emargination, the edge narrowly reflexed, surface moderately verrucose, genae rather sharply rounded, nearly right angled, the sharply defined anteocular groove wide and deep, extending upward from the gena to well above the upper edge of the eye, occiput very finely punctate.

Pronotum convex, one-fourth wider than long, anterior angles obtuse, posterior angles broadly rounded, sides nearly straight and parallel, the postapical groove deep in the anterior angles, somewhat constricting the surface and causing the anterior angles to appear explanate, the groove continuing inward almost to middle of the disc in a series of closely placed very coarse punctures and leaving a wide smooth finely punctate apical edge, similarly punctate smooth areas laterally before the posterior angles, the disc otherwise with numerous mixed very coarse and very fine scattered punctures, lateral foveae and median line basally indicated by more or less confluent coarse punctures, lateral and basal marginal groove deep and well defined.

Elytra nearly one-third longer than wide, twice as long as pronotum, sides slightly divergent to slightly beyond middle, striae strong and deep, crenately punctate, intervals convex with a median row of very fine punctures. Metasternum shining, very finely sparsely punctate; a deep median longitudinal line uniting anteriorly between the coxae with a well-defined lateral line which curves back around the coxae and out to a rough area extending forward at the sides; a short deep curving line over middle third of each side near posterior margin, the area within the curve somewhat depressed.

Abdominal segments smooth shining, crenate in front, each with a coarse puncture at lateral edge, second segment carinate at middle. Pygidium twice as wide as long, the eroded area covering entire disc; ventral margin with four long fine pygidial setae. Front femur shining, groove along anterior margin. Middle and hind femora shining, sparsely, very finely punctate,

posterior marginal line apparently absent but in reality entire and visible from rear along posterior edge. Posterior femur and tibiae equal in length, tarsus eight-tenths as long. First joint of posterior tarsus only feebly widened apically, three times as long as the second, long spur reaching to middle of second tarsal joint. Length 2.5 mm., width 1.1 mm.

Allotype female.—Similar to male except that the pygidium is two and one-half times as wide as long and the eroded area nearly five times as wide as long. Length 2.5 mm., width 1 mm.

Holotype and allotype in the United States National Museum. No. 58810.

Type locality.—Bossier Parish, 8 miles east of Shreveport, Louisiana. Holotype and allotype collected in moist sand under weeds and bent grass around peach trees, February 3, 1938, by W. F. Turner.

Paratypes.—Two hundred and one specimens as follows:

Ninety-six Bossier Parish, La., 3 Feb. 1938, 12 April 1937, 10 May 1938, 28 Sept. 1937, W. F. Turner; 44 Peach County, Ga., 26 August 1937, 29 Jan. 1941, 22 April 1942, 26 April 1940, 6 Nov. 1940, 5 Dec. 1940, W. F. Turner; 7 Lyons, Ga., 17 April 1947, Mark Robinson; 10 Fort Valley, Ga., June 1936, W. F. Turner; 1 seven miles south Pine Bluff, N. C., 10 Feb. 1937, W. F. Turner; 3 Harriman, Tenn., 24 Feb. 1938, W. F. Turner; 2 Tyler, Texas, 1 Sept. 1937, W. F. Turner; 1 West Point, Nebraska, June 1888, L. Bruner; 1 Riley County, Kansas, May, Popenoe; 36 Palisade, Col., 29 July 1937, W. F. Turner.

Paratypes will be placed in the collections of the British National Museum, Canadian National Museum, Museum of Comparative Zoölogy, Academy of Natural Sciences of Philadelphia, California Academy of Sciences, Chicago Natural History Museum, Cornell University, Ohio State University, and the private collections of Mark Robinson, and the writer.

Pleurophorus notialis varies from testaceous to reddish testaceous. In the lighter colored specimens a mustache of dark brownish lines shows through the clypeus; on each side of the head a small irregular spot shows through in front of the upper end of the anteocular groove; and a similar dark spot appears under the lateral foveae of the pronotum. In two individuals one of the pygidial setae is doubled to give five in all; however, the relative position of the close twin setae leaves no doubt of the normal number being four.

Pleurophorus grundeli (Van Dyke)

Psammodius grundeli Van Dyke, 1918, Bull. Br. Ent. Soc., vol. XIII, p. 10.

Oblong, slightly broader behind, convex, moderately shining, piceous. Legs rufous. Antennae rufotestaceous. Head moderately convex, coarsely verrucose, an impressed line separating the verrucose area from occiput, the occiput smooth except for more or less noticeable, few to numerous, fine punctures. Clypeus broadly, moderately emarginate, obtusely subangulate each side, sides slightly arcuate, genae obtuse, anteocular groove deep, following curvature of eye.

Pronotum one-third wider than long, slightly narrower in front, anterior angles obtusely rounded, hind angles broadly rounded, sides nearly straight, not completely visible from directly above, base arcuate, marginal line distinct, disc convex, with coarse deep scattered punctures and minute punctures on intervening areas, a deep postapical groove inward from anterior angles to middle third, three or four coarse punctures uniting to form fovea at middle of lateral declivity, a smooth lateral area before posterior angles, median line feebly impressed basally.

Elytra as wide at base and twice as long as pronotum, humeri obtuse, sides slightly divergent, striae deep, moderately closely crenately punctured, intervals convex, smooth. Metathorax smooth except for deeply impressed median line, a deep inverted L-shaped line midway each side, a roughened area anteriorly at extreme sides.

Abdominal segments smooth, crenate in front, the second carinate at middle. Anterior femur with strong marginal line on the shallowly emarginate lower edge. Middle and posterior femora stout, the marginal lines deep and entire. Posterior femur and tibia approximately equal in length. Tibia somewhat sinuate and gradually widened, its apex $\frac{5}{12}$ as wide as its length. Tarsus $\frac{5}{6}$ as long as tibia, the first joint swollen apically to nearly half as wide as its length, the second joint $\frac{2}{3}$ the length of the first. Female pygidium convex, smooth, a moderate puncture-like eroded impression laterally each side, with three setae-bearing punctures along the edge immediately below each, giving six pygidial setae in all. Male pygidium about twice as long as that of the female, the lateral eroded areas much larger, connected across middle third of pygidium by a transverse line, otherwise as in female. Length 3.25 mm., width 1.25 mm.

Type.—In Van Dyke collection, California Academy of Sciences.

Type locality.—Martinez, Contra Costa County, California.

Material examined.—Nineteen specimens from Martinez and Vine Hill, Contra Costa County, California.

Pleurophorus atlanticus new species

Psammodius nanus G. H. Horn, 1887, Trans. Amer. Ent. Soc., vol. XIV, p. 96, in part (not *Scarabaeus nanus* DeGeer, 1774, Mem. Hist. Ins., v. 4, p. 318).

Holotype male.—Oblong, slightly wider behind, convex, shining, dark reddish brown. Legs and underparts similarly colored. Antennae rufotestaceous. Head strongly convex, clypeus rather narrowly moderately deeply emarginate at middle, rounded each side of emargination, surface verrucose, genae obtusely rounded, the strong anteocular groove closely following curvature of the eye, occiput finely punctate.

Pronotum convex, one-fourth wider than long, anterior angles obtuse, posterior angles broadly rounded, sides nearly straight, converging slightly anteriorly, the postapical groove deep in anterior angles, continued inward almost to the middle in a series of large closely placed punctures and leaving a wide very finely punctate apical margin, similarly smooth finely punctate in front of lateral foveae and along sides to posterior angles, the disc with numerous mixed very coarse and very fine scattered punctures, lateral foveae and basally impressed median line indicated by more or less confluent large punctures; lateral and basal marginal groove deep and well defined.

Elytra one-fifth longer than wide, twice as long as pronotum, sides slightly divergent to beyond the middle, striae strong, deep, crenately punctate, intervals slightly convex with a median row of close very fine punctures. Metasternum shining, sparse scattered extremely fine punctures, median line deeply impressed posteriorly, obsolete anteriorly, a well-defined anterior metasternal line from between and back around middle coxae out to side margin, a moderately deep arched line over middle third each side along posterior margin, the area within the curve depressed anteriorly.

Abdominal segments smooth, shining, crenate in front, each with a coarse puncture at lateral edge, second segment carinate at middle, the penultimate slightly shortened medially. Pygidium three-fifths wider than long, the eroded area more than five times as wide as long and medially somewhat constricted; eight pygidial setae, the middle two noticeably longer than the others. Front femur shining, shallowly notched and grooved along anterior margin. Middle and posterior femora shining, sparsely extremely finely punctate, posterior marginal line entire but visible only from rear along posterior edge. Posterior femur subequal to tibia, tarsus seven-tenths as long as tibia, the first tarsal joint apically about half as wide as long, long spur reaching middle of second tarsal joint. Length 2.5 mm., width 1.1 mm.

Allotype female.—Similar to male except that the penultimate abdominal segment is not noticeably shortened medially, the terminal segment has two or three setae bearing punctures along posterior edge at sides, the pygidium is three times as wide as long with the eroded area constricted at middle and seven times as wide as long. The pygidial setae number nine in all, four on one side, five on the other, their length decreasing away from the middle pair. Length 2.85 mm., width 1.2 mm.

Holotype and allotype in the United States National Museum. No. 58811.

Type locality.—Clemson, South Carolina. Holotype and allotype collected April 8, 1942, by O. L. Cartwright.

Paratypes.—Seventy-five specimens as follows:

Thirty Clemson, S. C., 7, 8 April 1942, O. L. Cartwright; 2 Clemson, in flood debris, 30 March 1944, O. L. Cartwright; 7 Keowee River, Highway 183, Pickens County, S. C., 16 April 1942, J. A. Berly and O. L. Cartwright; 1 Jocassee, S. C., 5 May 1934, O. L. Cartwright; 1 Beaufort, S. C.; 2 "S. C." (Otto Lugger, Coll.); 1 Florence, S. C., 18 Jan. 1938, soil shaker, F. F. Bondy; 4 Sunburst, Pisgah Forest, N. C., 25 May 1938, O. L. Cartwright; 1 Black Mountain, N. C., 8 Sept. 1906, W. Beutenmuller; 3 Fort Monroe, Va., 19–4, Hubbard and Schwarz; 1 "Va."; 8 Newark, New Jersey (H. W. Wenzel Coll. and Liebeck Coll.); 1 Rancocas Park, N. J., 22 August 1927, M. B. Sim; 1 Haddon Hts., N. J., 29 March 1935, L. J. Bottimer; 4 Atlantic City, N. J., June 1910 (Reading Museum Coll.); 1 "N. J."; 3 Detroit, Mich., (2) Hubbard and Schwarz, (1) Liebeck Coll.; 3 Ganges, Mich., 9 June 1937, W. F. Turner; 1 Ojibway, Ontario, Canada, 4 June 1944, S. D. Hicks.

Paratypes will be placed in the collections of the British National Museum, Canadian National Museum, Museum of Comparative Zoölogy, Academy of Natural Sciences of Philadelphia, California Academy of Sciences, Chicago Natural History Museum, Cornell University, Ohio State University, Reading Public Museum, University of Minnesota, and the private collections of Mark Robinson, S. D. Hicks, and the writer.

The greater part of the Clemson series was taken about dusk on sand deposited during floods over the river pasture in the big bend of the Seneca River. The Keowee specimens were also taken crawling on sand in a field along the river in late afternoon.

Specimens vary in length from 2.1 mm. to 2.85 mm. Care must be taken in counting the pygidial setae since those of the terminal abdominal segment are sometimes so close as to be intermixed. There are normally eight pygidial setae but ten are not uncommon.

Pleurophorus micros (Bates)

Psammodius micros Bates, 1887, Biologia Centrali Americana, Vol. II, part 2, p. 103.

Psammodius nanus G. H. Horn, 1887, Trans. Amer. Ent. Soc., XIV, p. 96, in part (not *Scarabaeus nanus* DeGeer, 1774, Mem. Hist. Ins., v. 4, p. 318).

Pleurophorus batesi Arrow, 1903, Trans. Ent. London, p. 514.

Oblong, slightly wider behind, convex, shining, dark reddish brown to piceous. Legs somewhat lighter. Antennae testaceous. Head strongly convex; clypeus moderately deeply emarginate at middle, rounded each side of emargination, surface verrucose, occiput finely punctate; genae fimbriate, obtusely rounded, the moderately strong anteocular groove following the curvature of the eye.

Pronotum convex, seventh-ninths as long as wide, anterior angles obtuse, posterior angles broadly rounded, sides nearly straight, converging anteriorly, the postapical groove deep in the anterior angles, continued inward almost to the middle in a series of large closely placed punctures, and leaving a wide finely punctate apical margin, similarly finely punctate throughout, disc between lateral fovea interspersed with scattered coarse punctures separated by one to four or more times their diameters, lateral foveae and usually a basally feebly impressed median line indicated by large, more or less confluent punctures; lateral and basal marginal grooves deep and well defined.

Elytra one-fifth longer than wide, twice as long as pronotum, sides slightly divergent to beyond the middle, striae strong and deep, crenately punctate, intervals slightly convex with a median row of close very fine punctures. Metasternum shining, moderately close very fine punctures, median line not deeply impressed, no anterior metasternal line, no depression over middle third each side along posterior margin.

Abdominal segments smooth, shining, crenate in front, frequently with a coarse puncture at lateral edge, second segment carinate at middle. Male pygidium half as long as wide, female three-sevenths as long as wide, eroded area reduced to narrow line at sides and across the base, otherwise smooth; eight pygidial setae, the middle two the longest. Posterior femur shining, marginal line entire, visible from beneath for half its length. Posterior femur subequal to tibia, tarsus seventh-tenths as long as tibia, the first tarsal segment apically about half as wide as long, long spur as long as first two segments together. Length 3 mm., width 1.1 to 1.2 mm.

Type.—In British Museum (Natural History), London, England.

Type locality.—Capetillo, Dueñas, Guatemala (G. C. Champion).

Specimens examined.—Two hundred and sixty from the following localities:

California: Pasadena, Coachella, Los Angeles, Sacramento, Fresno, Long Beach, San Diego, Riverside, Laguna, Redondo, San Marino, Huntington Beach, Monrovia, Mission Valley, Sn. Bdno. Co., Indio, Blythe and Santa Cruz.

Nevada: Las Vegas. Utah: La Sal Mts. Arizona: Tucson,

Yuma, Grand Canyon, Phoenix, Sacaton. TEXAS: El Paso, Calvert, Somerset, Arlington, Marfa. FLORIDA: Citrus County. LOWER CALIFORNIA: Santa Rosa, Cape San Lucas. MEXICO: Guadalajara, Tejupilco, LaGloria, Vera Cruz, Colima, Temascaltepec, Presidio. GUATEMALA: Dueñas.

The specimens from Presidio and Dueñas, which were loaned by the British Museum, were co-types of *Pleurophorus batesi* Arrow and *Psammodius micros* Bates respectively.

The specimens studied show all gradations in color and thoracic punctuation between the two extremes exemplified by the light colored co-types of *batesi* Arrow and the very dark co-type of *micros* Bates. Specimens from California duplicate each. The very fine punctures of the metasternum are almost imperceptible in some, the median line obsolete in many specimens.

Pleurophorus parvulus (Chevrolat)

Psammodius parvulus Chevrolat, 1864, Ann. Soc. Ent. France, sec. 4, vol. 4, p. 415.
Diastictus parvulus Schmidt, 1922, Das Tierreich, pars 45, Aphodiinae, p. 488.
Pleurophorus parvulus Chapin, 1940, Proc. U. S. N. M., vol. 89, p. 8.

Elongate, subcylindrical, shining, dark castaneous. Antennae and femora testaceous. Head moderately convex, clypeus shallowly emarginate at middle, rounded and reflexed each side, surface very finely punctate and verrucose, vertex shining, with scattered fine punctures and a row of three or four coarse punctures each side.

Pronotum one-fourth wider than long, angles obtusely rounded, sides weakly arcuate, base feebly sinuate, lateral and basal marginal grooves deep and well defined, postapical groove deep in anterior angles and continued inward almost to middle in a series of close moderate punctures, surface shining, finely punctate throughout, numerous scattered coarse punctures except at sides and posterior angles beyond the usually noticeable lateral foveae, a shallow median groove over posterior half with closely placed coarse punctures.

Elytra seven-tenths as wide as long, sides parallel, striae deep and strong, crenately punctured, intervals moderately convex, with a median row of sparse very fine punctures. Metasternum shining, very finely punctate, with a strong deep longitudinal median groove, without lateral triangular depressions and anterior groove, though the eroded area at extreme side at least occasionally extends inward in a row of coarse punctures half way to median line.

Abdominal segments shining, sparsely very finely punctate, crenate in front, second carinate at middle. Eroded area of pygidium divided by a longitudinal carina, six or eight pygidial setae. Posterior femur with fine marginal line half length of femur. Posterior tarsus shorter than tibia, the joints very little wider apically, first as long as next two combined, upper spur very little longer. Length 1.8 mm., width 0.75 to 0.9 mm.

Type.—Location unknown to writer.

Type locality.—Cuba.

Specimens examined.—Forty-nine specimens as follows: Twenty-seven Jamaica, various localities and dates, 1937, Chapin & Blackwelder; 8 Colombia, Rio Frio, Mgd., V–1–10–28, Darlington; 11 Virgin Islands, St. Croix, W. I., H. A. Beatty (9), Blackwelder (2); 1 Cuba, Cayamas, E. A. Schwarz; 1 Dominica, B. W. I., 12–VI–36, Blackwelder; 1 Trinidad, St. Augustine, 24–IX–35, N. A. Weber.

Pleurophorus longulus new species

Holotype male.—Elongate, subcylindrical, shining, rufotestaceous, the elytral suture and margins darker. Antennae testaceous. Head moderately convex, very fine punctures and a few moderate punctures across occiput; clypeus finely punctate and verrucose, moderately deeply emarginate, rounded each side of emargination, sides straight, margin finely reflexed, genae obtusely rounded, not fimbriate, anteocular groove fine, hugging curvature of the eye.

Pronotum one-fourth wider than long, angles obtusely rounded, sides straight, base feebly sinuate, lateral and basal marginal grooves moderately deep, postapical groove moderately deep in anterior angles, continued inward nearly to middle in a series of close moderate punctures, surface finely punctate throughout, the disc between lateral foveae with numerous scattered moderately coarse punctures, median line feebly indicated basally by closely placed punctures.

Elytra twice as long as wide, sides parallel, striae moderately deep, crenately punctate, intervals weakly convex, with a median row of minute punctures. Metasternum smooth, shining, without lateral triangular depressions and anterior groove, very fine scattered punctures medially, median line deep posteriorly, obsolete anteriorly.

Abdominal segments smooth, shining, but with minute scattered punctures and a row of three or four larger setigerous punctures each side, segments crenate in front, second carinate at middle. Pygidium twice as wide as long, the eroded area narrowly divided by a median longitudinal carina, six pygidial setae. Posterior femur with marginal line fine, visible from below for one half length of femur. Middle and posterior tarsi as long as their respective tibiae, the joints but very little wider apically, long spur longer than first segment. Length 2.0 mm., width 0.9 mm.

Allotype female.—Not as slender, and darker than the male. Dark castaneous throughout, the elytral edge darker. The middle and hind tarsi are shorter than the tibiae. The abdomen is more convex, the pygidium wider and shorter. The terminal abdominal segment is slightly flattened at middle. Length 2.3 mm., width 1.0 mm.

Holotype and allotype in United States National Museum. No. 58812.

Type locality.—Camp Shelby, near Hattiesburg, Mississippi. Holotype and allotype collected July 30, 1942, by Lt. F. N. Young.

Paratypes.—One hundred and thirty specimens as follows:

Sixty-seven Harahan, La., at light, 6–IX–44, 26–VII–44, F. G. Werner; 16 Camp Shelby, Miss., 30 July 1942, F. N. Young; 4 Lucedale, Miss., 6–30–32, 1–17–32, 16–IX–30, Henry Dietrich; 19 Gulfport, Miss., VIII–38, R. E. Blackwelder; 1 Orange Grove, Miss., 7–10–34, R. H. Beamer; 1 Escombia Co., Ala., IX–3–37, W. F. Turner; 1 MacDill Field, Tampa, Fla., 22 May '43, Borys Malkin; 1 Yhancaroinza, Chuquca, Bolivia, April 1924, Coll., G. L. Harrington; 1 ex Honduras, Dec. 31, '34, Mobile No. 2763; 14 Tres Lagoas, Matto Grosso, Brazil, 6–10 Dec. '19, Cornell U. Lot 569, R. G. Harris; 1 Itapura, Matto Grosso, Brazil, 6, 8, 9 Dec. '19, Cornell U. Lot 569, R. G. Harris; 1 Embarcacion, Salta, Ar., Feb. 1922, Harrington; 3 Montevideo, Urg. to Salto, Arg., Mar. 6–14, '40, H. L. Parker.

Paratypes will be placed in the collections of the British National Museum, Canadian National Museum, Museum of Comparative Zoology, Academy of Natural Sciences of Philadelphia, California Academy of Sciences, Chicago Natural History Museum, Cornell University, Ohio State University, University of Kansas, and the private collections of Mark Robinson, Borys Malkin, F. N. Young, and the writer.

Locality labels indicate the distribution of this species to be from Southern United States to Argentina in South America, by far the widest of any known species of this genus. The elytra of the males are distinctly lighter in color, males appear more slender, and have noticeably longer middle and hind tarsi. The females have the terminal abdominal segment slightly flattened to noticeably depressed at middle. The species varies in length from 1.9 to 2.4 mm.

Pleurophorus gregalis new species

Holotype male.—Elongate oblong, convex, shining, piceous; clypeus, sides of pronotum, and legs dark testaceous. Antennae testaceous. Head strongly convex; clypeus moderately narrowly and quite deeply emarginate at middle, rounded each side of emargination, the narrowly reflexed sides almost straight to the obtusely rounded genae, surface verrucose; occiput with intermixed minute and scattered fine to moderate punctures, strong anteocular groove closely following curvature of the eye.

Pronotum convex, one-fourth wider than long, angles obtusely rounded, sides weakly arcuate, postapical groove deep in anterior angles and well marked half way to middle, median line moderately deep, strongly punctate, surface of disc with intermixed moderate and very fine punctures, smooth laterally beyond foveae and in front of postapical groove, lateral and basal marginal line deep and well defined.

Elytra two and one-fourth times as long as pronotum, about a third longer than wide, sides almost parallel, striae strong, deep, crenately punctured, intervals moderately convex, each with an irregular row of very fine punctures. Metasternum with a distinctly flattened median area, the median line deeply impressed over posterior half, obsolete anteriorly, without anterior metasternal groove, median area apparently smooth but with minute alutaceous sculpture and extremely fine shallow punctures, coarse, close very shallow punctures at extreme sides.

Abdominal segments minutely alutaceous, and with extremely fine scattered punctures, basal segments with a row of three or four coarser setigerous punctures toward sides, second segment carinate at middle, others crenate in front. Pygidium two-fifths as long as wide, the eroded area one-third as long as wide, distinctly and completely divided by a median carina; ventral margin bearing eight pygidial setae. Middle and posterior femora shining, very finely punctate, marginal groove distinct, one half the length of posterior margin. Posterior tibia subequal in length to femur, noticeably arcuate; first tarsal joint as long as next two combined, not noticeably widened apically. Length 2.4 mm., width 0.9 mm.

Allotype female.—Very similar to male except that the pygidium is one-third as long as wide and the eroded area a little more than one-sixth as long as wide. Length 2.6 mm., width 1.0 mm.

Holotype and allotype in United States National Museum. No. 58813.

Type locality.—Near Cali, Colombia, South America. The holotype label reads as follows: "Colombia Val. 2088 m. Mares above Cali, 5–III–'42, Chapin No. 670."

Paratypes.—Thirteen specimens, same data as holotype and allotype, vary in length from 2.3 to 2.7 mm., in width from 0.9 to 1.1 mm.

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ATAENIUS STRIGATUS (SAY) AND ALLIED SPECIES IN THE UNITED STATES

(COLEOPTERA: SCARABAEIDAE)

BY O. L. CARTWRIGHT [1]

Clemson, South Carolina

In the following paper a revised key to the *strigatus* group of *Ataenius* is presented, new synonymy is proposed, distribution is given by states, and a new species is described and named in honor of Prof. P. W. Fattig of Emory University who first sent specimens to the writer. Type material examined by the author in the present study included the typical series of all of Horn's species at the Academy of Natural Sciences of Philadelphia; the holotypes of all of Fall's species, Haldeman's *spretulus,* LeConte's *cognatus,* and a paratype of Hinton's *darlingtoni* in the Museum of Comparative Zoölogy at Harvard; the holotype of Blatchley's *solitarius* at Purdue University, Lafayette, Indiana; and paratypes of Hinton's *apicalis* and a metatype of Brown's *floridanus* in the writer's collection. *Ataenius strigicauda* was the only species not represented by type specimens.

In the key to the species, based largely on Dr. H. C. Fall's original key (Jour. N. Y. Ent. Soc., Vol. XXXVIII, 1930, pp. 93–108), the number of spinules in the fringe of the posterior tibiae refers only to the group between the accessory spine and the outer angle of the tibia.

Key to Species of Ataenius

1. Accessory spine of middle and hind tibiae closely adjacent to the shorter spur, without intervening spinules of the terminal fringe..2
   Accessory spine more removed from the spurs, one of the spinules of the terminal fringe intervening.....3

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[1] Technical Contribution No. 158 from the South Carolina Agricultural Experiment Station, Clemson, South Carolina.

2. Abdominal segments finely punctate at middle; posterior tibial fringe of ten or more spinules; large species, length 4.5 to 5.8 mm.; South Carolina, Georgia, Florida.....**erratus** Fall

Abdominal segments coarsely punctate at middle; metasternum with an irregular series of coarse punctures extending inward from sides to the central flattened area; posterior tibia with fringe of five spinules, accessory spine strongly developed; length 4.5 mm. or less; Texas.....**inquisitus** Horn

3. Base of head with fine scattered punctures; coarse punctures of pronotum almost or quite lacking in the antero-median area. **platensis** (Blanch.)

Base of head with a transverse band of coarse punctures.....4

4. Ninth elytral interval finely closely punctate; sides of pronotum crenate anteriorly; posterior tibial fringe invariably of four spinules.....**salutator** Fall

Ninth interval not differing from the others.....5

5. Metasternum with a small group of coarse punctures each side of median line close behind middle coxae; humerus and lateral elytral intervals coarsely roughly punctate.....**strigicauda** Bates

Humerus not coarsely punctate.....6

6. Elytra relatively short and convex, ⅓ longer than wide, sides distinctly arcuate; median metasternal line shorter than first two visible abdominal segments at middle; length 3.5 to 4.3 mm.; Appalachian region.....**brevis** Fall

Elytra more oblong elongate, ½ longer than wide.....7

7. Posterior face of profemur sparsely finely punctate and relatively smooth, rarely three or four shallow coarse punctures.....8

Posterior face of profemur coarsely, often roughly punctate.....12

8. Coarse punctures of pronotum generally distributed but everywhere sparse and very little closer laterally; strong posterior femoral line ½ distance from knee to trochanter; usually five spinules in posterior tibial fringe; eastern distribution.....**spretulus** (Hald.)

Coarse punctures of pronotum everywhere numerous even in antero-median area.....9

9. Elytral intervals flat and alutaceous on disc; male anterior tibial spurs incurved at tip.....**wenzelii** Horn

Elytral intervals not alutaceous.....10

10. Posterior femoral line absent or with a very short line at knee; abdominal segments punctate at middle; male anterior tibial spur not incurved at tip; length 4.5–5.8 mm.; Texas, New Mexico. **cognatus** (Lec.)

Posterior femoral line weak but plainly visible from behind, at least ⅓ distance from knee to trochanter; anterior tibial spur of male incurved at tip.....11

11. Small narrow species, length 3.5 mm.; Florida.....**rudellus** Fall
Coarse punctures of pronotum relatively much larger, ventral segments nearly smooth at middle; larger species, length 4–4.7 mm.; California, Arizona, Utah.....**californicus** Horn
12. Clypeus with noticeable transverse rugulae; posterior tibia with fringe of four or five spinules; usually at least a few coarse punctures coalescing in anterior angles of pronotum; more northern distribution.....**strigatus** (Say)
Clypeus finely punctate, transverse rugulae absent or very weakly developed; posterior tibial fringe of six to eight spinules; more southern distribution.....13
13. Apical declivity of elytra with intervals eroded each side.
apicalis Hinton
Elytral intervals normal on apical declivity..**fattigi** Cartwright n. sp.

Notes, Synonymy, and Distribution

Ataenius erratus Fall is one of the larger species of the *strigatus* group occurring in the United States. The males have the anterior spur incurved at the tip. Specimens have been seen from Florida, Georgia, and South Carolina.

Ataenius inquisitus Horn has been seen by the writer from Texas only. It superficially resembles *platensis* in lacking coarse punctures across the base of the head and in the antero-median area of the pronotum.

Ataenius platensis (Blanch.) (synonym: *anticus* Fall. See Hinton, 1937, Ann. and Mag. of Nat. Hist., ser. 10, vol. xx, p. 177). Specimens from Santiago del Estero and Buenos Aires, Argentina, have been compared with specimens from the United States and I found no differences. The species has been determined from Arkansas, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas.

Ataenius salutator Fall (synonym: *darlingtoni* Hinton) has been seen from South Carolina, Georgia, Florida, Alabama, Mississippi, and Louisiana.

Ataenius strigicauda Bates (synonyms: *floridanus* Brown, *solitarius* Blatchley). Examination of the holotype of Blatchley's *solitarius* shows it to be identical with *floridanus* Brown and *strigicauda* Bates. Dr. Blatchley's description of *solitarius* is in error on several major points. The holotype of *solitarius* has an occipital band of coarse punctures, the front is finely punctate;

the pronotal punctures are mixed, coarse and very fine; the elytral striae are crenate punctate, the lateral intervals and shoulders coarsely punctate; and the accessory spines of the posterior tibiae are very strongly developed. The species can in no manner be considered closely allied to *A. socialis* Horn since it differs in all essential characters and is quite different in general shape. Specimens of *strigicauda* have been examined from Florida and South Carolina.

Ataenius brevis Fall is apparently a mountain species. Specimens are at hand from Massachusetts, New York, Pennsylvania, New Jersey, North Carolina, South Carolina, and Georgia.

Ataenius spretulus (Hald.) (synonyms: *consors* Fall, *falli* Hinton) has been seen from Ontario, Canada, and from Vermont, Massachusetts, New York, New Jersey, Pennsylvania, Maryland, West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Kentucky, Ohio, Indiana, Michigan, Minnesota, South Dakota, Iowa, Missouri, Kansas, Oklahoma, Arkansas, Louisiana, and Texas.

Ataenius wenzelii Horn (synonym: *ludovicianus* Fall). Examination of Horn's typical series of this species shows his original description is in error on at least three important characters. *Ataenius wenzelii* does have an intercoxal carina, the tibia has an accessory spine, and the posterior femoral line though weak is visible from behind, extending one-third the distance from knee to trochanter. The single specimen mounted ventral side up, in the Horn series, apparently lacks the intercoxal carina; however, this specimen is exceptional as others in the series have a distinct carina. All specimens have the accessory spine on the hind tibia. Fall's *ludovicianus* and Horn's *wenzelii* are apparently identical. Specimens of *Ataenius wenzelii* have been determined from Pennsylvania, New Jersey, South Carolina, Florida, Louisiana, and Texas.

Ataenius cognatus (Lec.) has been seen by the writer from Texas and New Mexico only. Most specimens bearing this name, especially from northern states, are either *strigatus* or *spretulus*.

Ataenius rudellus Fall is represented by very few specimens, all collected in Florida. The species is close to *wenzelii* and may eventually be considered a synonym.

Ataenius californicus Horn has been seen from California, Arizona, and Utah.

Ataenius strigatus (Say) is a common, widely distributed species. Specimens have been examined from New Hampshire, Massachusetts, New York, Pennsylvania, New Jersey, Maryland, West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida, Mississippi, Arkansas, Kentucky, Ohio, Michigan, Indiana, Illinois, Wisconsin, Iowa, South Dakota, Nebraska, and Kansas.

Ataenius apicalis Hinton, described from Mexico (Annals and Mag. Nat. Hist., ser. 10, vol. xx, 1937, p. 195), has probably not previously been recognized from the United States. It is practically identical with *fattigi* except that each side of each elytral interval is distinctly eroded over the apical fifth of the elytra. Specimens have been seen from Virginia, South Carolina, Georgia, Alabama, Mississippi, Louisiana, and Texas.

Ataenius fattigi new species

Holotype male.—Length 4.8 mm., width 2.25 mm. Oblong, shining, black, legs brownish piceous. Head moderately convex, a wide band of coarse closely placed punctures across the base, very fine close punctures over front and clypeus, very faint traces of transverse rugulosity perceptible at anterior edge of clypeus. Clypeus widely shallowly emarginate, broadly rounded each side, the edge finely reflexed.

Pronotum rectangular, three-tenths wider than long, marginal line of sides and base deep and entire, edge not crenate, anterior angles obtusely rounded, posterior angles obtuse but distinct, surface with intermixed coarse and very fine punctures throughout, the coarse punctures slightly smaller and less closely placed anteriorly at middle, dense at sides, especially in anterior angles where they are separated by less than their diameters but are not confluent.

Elytra one-fourth longer than wide, sides parallel, humeri strongly dentate, striae strong, crenately punctate, intervals almost flat on disc, only strongly convex at apex, all intervals similarly sparsely minutely, rather irregularly punctate. Mesosternum with a moderately long intercoxal carina. Metasternum with a little coarse rugose sculpture at extreme sides, otherwise shining and finely punctate, a group of a dozen or so coarse punctures posteriorly each side of the deeply impressed longitudinal median line, the median line deeper at each end and not abruptly terminated.

Abdominal segments crenate in front, coarsely punctate at sides, the punctures gradually finer across the middle. Profemurs with perimarginal groove, the posterior face closely coarsely punctate, the punctures becoming rapidly

finer toward the base and lower edge. Anterior tibiae weakly crenate above upper tooth which is nearer apex than base; first tarsal joint subequal to following two combined, first two tarsal joints together and spur equal in length. Middle and posterior femurs finely punctate, marginal line deep, half the length of the femur. Posterior tibia with intervening spinule between spurs and the strongly developed accessory spine, six spinules in terminal fringe between accessory spine and outer apical angle, first joint of posterior tarsus longer than long spur and subequal to remaining four joints combined.

Allotype female.—Length 5.4 mm., width 2.4 mm. Similar to holotype except that the coarse punctures of the pronotum are not quite so numerous, the metasternum is finely punctate without the group of coarse punctures, the pygidium is not as long, and the hind tibiae bear a fringe of seven spinules on one and eight on the other.

Holotype and allotype deposited in the United States National Museum, No. 58821.

Type locality.—Georgetown County, South Carolina, at junction of Highways U. S. 17 and South Carolina 786 to Belle Isle Gardens. Holotype collected September 6, 1945, by O. L. Cartwright. Allotype collected at Blaney, South Carolina, September 2, 1945, by same collector.

Paratypes.—One hundred and sixteen specimens from the following localities: Valdosta, Georgia, August 28, 1938, P. W. Fattig; Vidalia, Georgia, August 18, 1937, P. W. Fattig; Hinesville, Georgia, June 10, 1941, J. G. Watts; Keesler Field, Biloxi, Mississippi, August 25, 1943, F. N. Young; Lucedale, Mississippi, October 7, 1927, H. Dietrich; Ocean Springs, Mississippi, March 27, 1932, H. Dietrich; Lake Lucy, Florida, November 26, 1907, collector unknown; Canal Point, Florida, July 20, 1927, M. D. Leonard; Gainesville, Florida, July 10, 1927, J. S. Rogers; September 20, 1947, at light, F. N. Young; Ft. Myers, Florida, August 1, 1927, M. D. Leonard; Ocala National Forest, Marion County, Florida, July 24, 1938, Hubbell and Friauf; Little Manatee River, Hillsboro County, Florida, August 14, 1938, Hubbell and Friauf; McDill Field, Tampa, Florida, May 22, 1940, Borys Malkin; Lake Alfred, Florida, July 2, 1929, L. J. Bottimer; Bethune, South Carolina, July 10, 1941, F. K. Hinnant; Meredith, Blackville, Florence, Ritter, Hampton, Kline, Seabrooks Island, Walterboro, Green Pond, Charleston, Cayce, and Yemassee, South Carolina, April to September, 1927 to 1945, O. L.

Cartwright; Edgewood, Maryland, September 7, 1918, H. Dietrich; Atsion, New Jersey, June 11, 1945, J. W. Green; Wildwood, New Jersey, June 29, 1935, L. J. Bottimer; Salem, New Jersey, August 15, 1936, L. J. Bottimer; and a single specimen labeled "Pa." "W. G. Dietz coll." Paratypes will be placed in the collections of the British and Canadian National Museums, the Academy of Natural Sciences of Philadelphia, California Academy of Sciences, Museum of Comparative Zoölogy, Ohio State University, Cornell University, University of Michigan, and private collections of Mark Robinson, J. W. Green, L. J. Bottimer, and C. A. Frost.

Over eighty per cent of the specimens collected by the writer were found under broken leaves, twigs, and surface litter along paths on hard ground in woodlands; two were found under dry cow dung in a burned over woods, and a few were taken in trap lights.

Ataenius fattigi is very close to *strigatus* (Say) but is usually larger, the transverse wrinkles of the clypeus are very weak or absent, the coarse punctures in the anterior angles of the pronotum are close but rarely confluent, the spinules between the accessory spine and outer angle of the posterior tibia number six or seven, and most of the specimens seen have been from southern states. *Ataenius strigatus* is smaller, clypeal rugulosity is more extensive and noticeable, at least a few coarse punctures in the anterior angles of the pronotum are confluent, the spinules of the posterior tibia number four or five, and the species has a more northern distribution. Data on these and two other closely related forms are presented in the following table:

Species	Specimens Measured	Length in mm.			Specimens Examined	Spinules of post. tibiae				
		Min.	Ave.	Max.		4	5	6	7	8
strigatus	109	3.75	4.55	5.25	110	70	141	9		
spretulus	131	4.05	4.71	5.40	84	9	122	37		
apicalis	82	4.20	5.07	6.00	72		7	86	49	2
fattigi	95	4.50	5.13	6.00	95		6	101	77	6

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A NEW SPECIES OF CANTHON WITH A KEY TO THE HUMECTUS GROUP

(SCARABAEIDAE: COLEOPTERA)

BY MARK ROBINSON

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(Text-figures)

The specimens used as the basis of this paper are about seventy-five in number and are located in the collection of the author unless otherwise noted.

Key to the Species of the Humectus Group

1. The distal two teeth of the anterior tibiae are more approximate than the proximal two.....2
   The teeth on the anterior tibiae are equidistant; surface of the pronotum and elytra without shining spots or granules; color dark blue.....**humectus** Say
2. Pronotal and elytral sculpturing with shining spots or low granules..3
   Pronotal and elytral sculpturing without trace of shining spots or low granules; color dark blue.....**sayi** new species
3. Pronotal and elytral sculpturing with shining spots intermixed with the punctures, these spots have no height; color black.....4
   Pronotum with shining spots intermixed with punctures; elytra with low granules intermixed with the punctures; color black or dark blue.....**hidalgoensis** Bates
4. Anterior tibiae gently dilated on the inner side from before the middle to the apex; size a little smaller.....**incisus** Robinson
   Anterior tibiae abruptly dilated on the inner side from before the middle to the apex; size a little larger.....**assimilis** Robinson

Canthon humectus Say (Text-figs. 1 and 2.)

1832. *Ateuchus humectus* Say, N. Sp. N. A. Ins., p. 4.
1863. *Canthon gagatinus* Harold, Ann. Soc. Ent. Fr., p. 173.
1863. *Canthon gagatinus* var. *amethystinus* Harold, Ann. Soc. Ent. Fr., p. 173.
1889. *Canthon humectus* Say, Bates, Biol. Cen. Am., Col. II, pt. 2, p. 386.

There has been a great deal of confusion concerning the identity of the species of *Canthon* in the *humectus* group. The forms *gagatinus* and *amethystinus* were reduced to synonymy under *humectus* by Bates on the recommendation of M. Sallé. Whether this is the case or not cannot be determined until the types of Harold's forms are found and dissected and their true status made known.

I have examined specimens determined by Arrow, Boucomont and Chapin as *humectus* and these specimens agree with *humectus* as limited by this paper.

Specimens of this species have been examined from Las Vigas, La Venta, Patzcuaro, Rinconada and Guadalupe in Mexico.

Canthon sayi new species (Text-figs. 3 and 4.)

Orbicular; subopaque to shining; dark blue.

Clypeus shallowly, broadly emarginate in front; entire edge reflexed. The inner side of the reflexed edge bears a row of brownish setae. The surface of the head is barely, finely granulate with a few fine punctures, these punctures becoming coarser toward the clypeal edge.

The median angle of the prothoracic side margin is slightly nearer the posterior angle than to the anterior angle. Under the side margin near the median angle is a blunt carina. Between the median angle and the anterior angle under the side margin is a well-developed tubercle. The surface of the pronotum is nearly smooth on the disk but becomes finely granulate and sparsely punctate laterally. Some of the specimens are sculptured over the entire disk as they are laterad.

The elytral striae are barely visible. The surface of the intervals is finely granulate and sparsely punctured.

The pygidial surface is sculptured about the same as the elytral intervals. The anterior tibia is tridentate, the two distal teeth more approximate than the proximal two. Between these teeth and above the third tooth the outer edge is crenate. Posterior tibial apex with a single spur.

Male.—Anterior tibial spur wider towards the apex. These spurs are worn in the specimens at hand but the apices of the spurs probably are triangularly emarginate. The pygidium is narrower in the male and when viewed sideways it is rounder than that of the female.

Female.—Anterior tibial spur long, curved; acute at the tip.

Length, 13.0 to 14.2 mm.; breadth, 8.0 to 8.3 mm.

Type.—♂; south Vera Cruz, Mexico. [In the collection of the Academy of Natural Sciences of Philadelphia.]

Allotype.—♀; with the same data as the type. [In the collection of the Academy of Natural Sciences of Philadelphia.]

Paratypes.—1 ♂, 1 ♀; with the same data as the type. 3 ♂, 4 ♀; Oaxaca, Mexico. 1 ♂; Mexico. Paratypes are deposited in the collections of the United States National Museum and O. L. Cartwright.

Canthon hidalgoensis Bates (Text-figs. 5 and 6.)

1887. *Canthon hidalgoensis* Bates, Biol. Cent. Amer., Col. II, pt. 2, p. 32.

This species was described from Zacualtipan in Hidalgo. Specimens are now before me from Sa Joya, Galeana, Cerro de Mercado and Sierra de Penetenre in Mexico. In addition I have examined several specimens from Brownsville, Texas. A male paratype from Zacualtipan in the collection of the United States National Museum has been examined and it agrees with the specimens from the above mentioned localities.

Canthon incisus Robinson (Text-figs. 7 and 8.)

1948. *Canthon assimilis incisus* Robinson, Trans. Amer. Ent. Soc., LXXIV, p. 30.

This species was originally described as a subspecies of *assimilis*. Since the original description was published the author has examined a large series of this form from the state of Morelos, Mexico. All of the specimens examined agree with the type series in the characters mentioned in the key plus the different male genitalia. For this reason I now consider that this form is a distinct species.

Canthon assimilis Robinson (Text-figs. 9 and 10.)

1946. *Canthon assimilis* Robinson, Trans. Amer. Ent. Soc., LXXII, p. 49.

In addition to the type series from the state of Nayarit a series of this species has been examined from Guadalajara, State of Jalisco, Mexico.

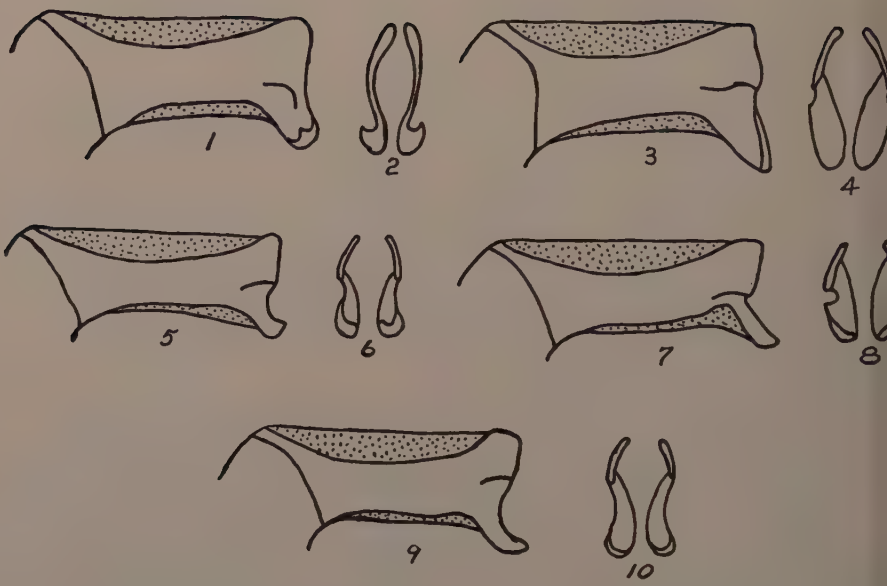

Fig. 1.—*Canthon humectus* Say. Lateral view of left clasper. Fig. 2.—*Canthon humectus* Say. Caudal view of claspers. Fig. 3.—*Canthon sayi* new species. Lateral view of left clasper. Fig. 4.—*Canthon sayi* new species. Caudal view of claspers. Fig. 5.—*Canthon hidalgoensis* Bates. Lateral view of left clasper. Fig. 6.—*Canthon hidalgoensis* Bates. Caudal view of claspers. Fig. 7.—*Canthon incisus* Robinson. Lateral view of left clasper. Fig. 8.—*Canthon incisus* Robinson. Caudal view of claspers. Fig. 9.—*Canthon assimilis* Robinson. Lateral view of left clasper. Fig. 10.—*Canthon assimilis* Robinson. Caudal view of claspers.

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DERMAPTERA RECORDS FROM THE SOLOMON, NEW HEBRIDES AND LOYALTY ISLANDS

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The following records have chiefly been taken from material from the three island groups, submitted to me for study by the American Museum of Natural History and the California Academy of Sciences. While none of the five species here discussed is new to science, three have not been recorded previously from these islands, and one other is here first reported from the New Hebrides.

The occurrence of the genera *Tagalina* and *Echinosoma* in the Solomons is further evidence of the strong Indo-Malayan influence in the fauna of that group.

Pygidicranidae

Tagalina semperi semperi Dohrn

1863. *T[agalina] semperi* Dohrn, Stett. Entom. Zeit., xxiv, p. 45. [♀; northern portion of the island of Luzon[, Philippines].]

Solomon Islands: Malaita; 1 ♂; [A.M.N.H.].

This specimen has been compared with a female from Friedrich-Wilhelmshafen, New Guinea and several males from the Milne Bay region of the same island. Its coloration is that of typical *semperi*, with the head cephalad of the eyes pitch black, the occipital section ochraceous. The tegminal darker bars are relatively broad, but less strongly contrasted than in the other specimens.

The only previous exact Solomon Island record for *T. s. semperi* is apparently that of Burr, 1912, from Santa Isabel Island.[1] I am unacquainted with *T. grandiventris* (Blanchard), which was described from San Jorge (St. George) Island, which is near Sta. Isabel, in the Solomons. It is possible the latter may be a mere variant of *semperi*.

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[1] Ann. k.-k. Natur. Hofmus., Wien, xxvi, p. 67, (1912).

The genus *Tagalina* is known to range from Luzon in the Philippines through the more eastern Netherlands Indies to New Guinea, the Bismarck Archipelago (New Ireland) and the Solomons.

Echinosoma yorkense Dohrn

1869. *Echinosoma yorkense* Dohrn, Stett. Entom. Zeit., xxx, p. 234. [♀; Cape York, Australia.]

Solomon Islands: Malaita; 1 ♂; [A.M.N.H.].

This specimen has been compared with a pair from Kuranda, Queensland,[2] a female from North Queensland,[3] and a female from Mt. Lamington, northern division of Papua,[4] and I regard it as inseparable. The Queensland specimens are all slightly larger (body length exclusive of forceps, 12.2 (♂), 11.2–12.8 (♀) mm.), but that from Malaita is intermediate in size (body length exclusive of forceps, 10.1 mm.) between these and the Papuan female (8.9 mm.).

The Melanesian and Indonesian species of *Echinosoma* are poorly defined and poorly understood, and some of those standing in current literature as distinct species may prove to be at most but geographic subspecies of others. Color features have been stressed inordinately and the indications are that certain synonymy will be created. I have already discussed intra-specific color variation in African species of this genus.[5]

This is the first record of *Echinosoma* from the Solomons, and constitutes the most eastern known one of it in the Indo-Pacific area.

Labiduridae

Anisolabis annulipes (Lucas)

1847. *Forficelisa annulipes* Lucas, Ann. Soc. Entom. France, (2) v, Bull., p. lxxxiv. [Sex?; "Jardin des Plantes," Paris (introduced).]

Solomon Islands: Vella Lavella; XI, 14, 1927; 1 ♀; [A.M.N.H.].

New Hebrides: Eromanga; III, 1933; (L. Macmillan); 1 ♂; [A.M.N.H.].

These are apparently the first records of this widely distributed species from either the Solomon or New Hebrides Groups. The

[2] II, 3 and 9, 1925; (F. P. Dodd); 1 ♂, 1 ♀; [A.N.S.P.].
[3] X, 4, 1920; (J. A. Kusche); 1 ♀; [A.N.S.P.].
[4] V, 1927; (C. T. McNamara); 1 ♀; [A.N.S.P.].
[5] Vide Bull. Amer. Mus. Nat. Hist., xlix, pp. 360–366, (1924).

species was, however, reported in 1929 by Günther from four localities in New Guinea.[6]

Labidura riparia (Pallas)

1773. *Forficula riparia* Pallas, Reise Russische Reichs, II, Buch 2, Anhang, p. 727. [♂; Shores of the Irtysch (Irtin) River, western Siberia.]

SOLOMON ISLANDS: Star Harbor, San Cristobal Island; 1933; (Templeton Crocker Exped.; N. W. Hows, Jr.); 1 ♂, 2 juvs.; [Calif. Acad.]. Santa Ana Island; VII, 3, 1933; (Templeton Crocker Exped.; M. W. Hows, Jr.); 2 ♂, 1 ♀, 5 juvs.; [Calif. Acad.].

These are the first records of this widely distributed species from the Solomons, although it has been reported from New Guinea. Elsewhere in the Pacific area to date it has been reported only from various localities in the Hawaiian Islands and from Upolu, Samoa. In all the Solomon adults the wings but slightly surpass the apices of the elytra, as Hebard has already noted as true with the majority of Hawaiian individuals examined by him in 1922.[7]

All of the Solomon adults are relatively small, distinctly under the average size of the species, and in coloration they are quite dark. The males show no projecting points on the distal margin of the anal segment, while the arms of the forceps each bear a single tooth-like node slightly distad of the middle.

CHELISOCHIDAE

Chelisoches morio (Fabricius)

1775. [*Forficula*] *morio* Fabricius, System. Entom., p. 270. ["Insula Otaheita maris pacifici". [Tahiti].]

SOLOMON ISLANDS: Choiseul Island; XI, 25, 1927; 1 ♀; [A.M.N.H.]. Florida Island; IX, 12, 1927, 1 ♀; [A.M.N.H.]; 1 ♀; [A.N.S.P.]. Kau Kau Plantation, Guadalcanal Island; V, 22, 1933; (Templeton Crocker Exped.; M. Willows, Jr.); 1 ♀; [Calif. Acad.]. Malaita Island; I, 11, 1930 and no date; 9 ♂, 9 ♀, 1 juv.; [A.M.N.H. and A.N.S.P.]. Auki, Malaita Island; 1 ♀; [A.N.S.P.]. Uvas Cove, Malaita Island; V, 28, 1933; (Templeton Crocker Exped.; M. Willows, Jr.); 1 ♂; [Calif. Acad.]. Northwest end of Bellona Island; VI, 22, 1933; (Templeton Crocker Exped.; M. Willows, Jr.); 1 ♂, 1 ♀, [Calif. Acad.]. Kungana Bay, Rennell Island; VI, 14, 1933; (Templeton Crocker Exped.; M. Willows, Jr.); 1 ♂, 1 ♀, 1 juv.; [Calif. Acad.].

[6] Mitt. Zoolog. Mus. Berlin, XV, p. 60, (1929).
[7] Occ. Papers Bernice P. Bishop Mus., VII, p. 315.

New Hebrides: Vila, Efate Island; IV, 1903; 1♀; [A.N.S.P.]. Eromanga Island; III and IV, 24, 1937; (L. Macmillan); 3♂, 2♀, 2 juvs.; [A.M.N.H.]. Aniwa Island; III, 1937; (L. Macmillan); 1♂, 2♀; [A.M.N.H. and A.N.S.P.]. White Sands, Tanna Island; X, 21, 1937; (L. Macmillan); 2♂, 2♀, 1 juv.; [A.M.N.H. and A.N.S.P.]. Fortuna Island; VII, 10, 1937; (L. Macmillan); 5♂, 6♀, 3 juvs.; [A.M.N.H. and A.N.S.P.]. Aneityum Island; VIII, 24, 1937; (L. Macmillan); 1♂, 2♀; [A.M.N.H.].
Loyalty Islands: Maré Island; I, 5, 1938; 1♀; [A.M.N.H.].

This widely spread Indo-Pacific species has previously been recorded from Maré, Lifu and Uvéa in the Loyalties (Burr, 1914), Espiritu Santo in the New Hebrides (Hincks, 1947), and from Guadalcanal (as Guadalcanar), New Georgia, Malaita and Bougainville in the Solomons (Günther, 1933). The present records materially amplify the recorded details of distribution in the areas here covered.

The above series shows the marked range in size in both sexes which is characteristic of this plastic species. Extremes in size in the series, and from certain localities, measure (in millimeters) as follows:

	Length of body (to base of forceps but exclusive of same)	Length of forceps
♂, Malaita, Solomons	11.9	3.9
♂, Malaita, Solomons	16.4	6.3
♂, Fortuna, New Hebrides	17.1	7.8
♀, Rennell Island, Solomons	18	7
♀, Aniwa, New Hebrides	18.5	7.6
♀, Fortuna, New Hebrides	14.3	4.9
♀, Fortuna, New Hebrides	16.3	5.5

The male individuals exhibit both of the types of forceps found in that sex of the species, which have been described long ago by Burr.[8] The two occur in the same locality and thus have no geographic correlation. One male from Fortuna Island and a female from Aniwa have forceps arms of dissimilar length, the male being in essentially the same condition as the unique asymmetrical male from Rotuna, New Georgia Island, Solomons, on which Günther unwisely erected the species *Chelisoches paravicinii*.[9] The latter specimen may be, as Günther intimates, a par-

[8] Fauna Brit. India, Dermaptera, p. 135, (1910).
[9] Verhandl. Naturf. Gesell. Basel, XLIV, Teil 2, p. 162, fig. 5, (1933). Günther subsequently reported a female from Kira Kira, San Cristobal, Solomons, as representing this species (Mitt. Deutschen Entom. Gesell., E. V., VIII, p. 9, (1937)).

tial gynandromorph, or the forceps may have been regenerated, and thus is paralleled in the present individual contained in a series of otherwise normal males from Fortuna Island. No useful purpose is served by the description as species of such abnormal or teratological individuals. We may have regional instability such as this in certain species, but until our knowledge of such presumably aberrational tendencies is more complete, we should refrain from assigning names to them.

All perfect antennae in the series here reported have whitish annuli; in some specimens one antenna has the band involving the usual number (two) of articles, while the other has but one article pale. Three adult males from the New Hebrides (one each from Aniwa, Fortuna and Aneityum) are of the brownish coloration occasionally met in this species.

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DERMAPTERA RECORDS FROM VARIOUS PACIFIC ISLANDS

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(Text-figure)

The following records have been assembled while studying series of Dermaptera from Melanesia and the Caroline Islands, as well as the material collected by the Mangareva Expedition of the Bishop Museum. The material here listed was submitted to me for study by the American Museum of Natural History and by the California Academy of Sciences, or is contained in the series of the Academy of Natural Sciences of Philadelphia.

Of the six species here discussed one is new to science, and the other five were previously unreported from one or more of the island groups from which they are here recorded.

Labiduridae

Anisolabis maritima (Gené)

1832. *Forficula maritima* Gené, Sagg. Monogr. Forf. Indig., p. 9. [♂, ♀; "Along Mediterranean at Genoa, Italy and Nice, France; and in Tuscany, Italy."]

Caroline Islands: Mog Mog Island,[1] Ulithi Atoll; VI, 30, 1945; (J. A. Slater); 1 juv. ♀; [A.N.S.P.].

This is the first record of this widely distributed species from any of the numerous island groups between the Hawaiian Archipelago, Wake Island, Johnston Island, Nassau Island, the Austral group and Samoa, from all of which it has previously been recorded, and the continental island masses off the east coast of Asia.

Anisolabis annulipes (Lucas)

1847. *Forficelisa annulipes* Lucas, Ann. Soc. Entom. France, (2) v, Bull., p. lxxxiv. [Sex ?; "Jardin des Plantes," Paris (introduced).]

[1] For some notes on Ulithi Atoll, see Rehn, Notulae Naturae, Philadelphia, no. 157, (1945).

Marshall Islands: Eniwetok Island, Eniwetok Atoll; VIII, 6, 1945; (R. Allen); 1 ♂, 1 ♀; [A.N.S.P.].

Palmyra Island: IV, 1, 1933; (M. Willows, Jr.); 1 ♀; [Calif. Acad.].

Easter Island: Hanga Roa; I, 17, 1935; (Crocker Exped.); 1 ad. ♂, 1 juv. ♂, 2 ♀; [A.M.N.H.].

Juan Fernandez Island: I, 31, 1935; (Crocker Exped.); 3 ♂; [A.M.N.H.].

Sjöstedt has already recorded *annulipes* from Easter Island and Juan Fernandez as the synonymous *bormansi* Scudder, and Swezey, in 1914, reported it from Palmyra Island. In a forthcoming report on the Dermaptera of the Mangareva Expedition I am giving a number of records of this species from islands of the Taumotu and Austral groups. Except for records of this species from Guam, the Eniwetok record is the first from any of the groups of islands generally referred to as Micronesia.

Labidura riparia (Pallas)

1773. *Forficula riparia* Pallas, Reise Russische Reichs, II, buch 2, Anhang, p. 727. [♂; Shores of the Irtysch (Irtin) River, western Siberia.]

Hawaiian Islands: Nawiliwili, Kauai Island; V, 1925; 3 ♂, 4 ♀; [A.M.N.H.].

Marshall Islands: Eniwetok Island, Eniwetok Atoll; VIII, 6, 1945; (R. Allen); 1 ♂, 1 ♀; [A.N.S.P.].

I am noting the above recorded Hawaiian specimens particularly, as all have the normally exposed portion of the wings as extensive proportionately as in the average of the species. Hebard [2] has noted that the majority of the specimens from the Hawaiian group, then before him, had "the wings reaching only very slightly beyond the tegmina." It is evident that the variation in this respect, which is found in the species in other areas, is equally evident, at least locally, in its Hawaiian representatives. None of the Hawaiian males here reported has projecting paired points on the distal margin of the anal segment, and but a single well-marked tooth-like node is present slightly disto-mesad on the internal margin of their forceps.

The Eniwetok pair, which constitute the first record of this widely distributed species from any of Polynesia except the Samoan and Hawaiian groups, have the wing-scales developed as the above-mentioned Nawiliwili individuals. The Eniwetok male

[2] Occas. Papers Bernice P. Bishop Mus., VII, p. 315, (1922).

has two very closely placed minute nodes mesad on the distal margin of the anal segment, their proximity much closer than in the average male showing these points, and similar in this respect to an even weaker pair noticed in a male from Kobe, Japan, in the Academy series.

LABIIDAE

Sphingolabis hawaiensis (Bormans)

1882. *F[orficula] hawaiensis* Bormans, Ann. Mus. Civ. Stor. Nat. Genova, XVIII, p. 341. [♂, ♀; Hawaiian Archipelago.]

TAUMOTU ISLANDS: Pitcairn Island; XII, 28, 1934; (Crocker Exped.); 1♀; [A.M.N.H.].

This broadly distributed Indo-Pacific species has been recorded from the Hawaiian, Society, Marquesas, Fiji and Samoan groups, but the present record extends the known range to the eastward. Comparison has been made with a series representing all the major areas in the Pacific from which the species has been reported.

Sphingolabis auricoma [3] new species

When compared with the genotypic species *S. semifulva* (Bormans) [4] the present one differs in the female sex in its larger size, slightly more longitudinal but similarly shaped pronotum, the more strongly pilose pronotum, elytra, wing-scales, abdomen and limbs, in the narrowly lamellate proximal three-fifths of the ventro-internal margin of the forceps, instead of the distal three-fifths alone being lamellate, in the definite tooth on the same margin at the distal extremity of the lamellate section, in the pygidium of the female being produced as in *semifulva* but appreciably constricted mesad with the distal margin transverse truncate, and in the surface of the elytra and wing-scales being densely, finely and almost shagreenously cribroso-punctulate.

From *S. hawaiensis* (Bormans), which is of broad Pacific and Indo-Malayan distribution, *auricoma* differs in its slightly stouter and less slender antennal articles, slightly more elongate pronotum, more pilose pronotum, elytra, wing-scales, abdomen and limbs,

[3] In allusion to the golden hairs clothing parts of the body.

[4] *Sparatta semi-fulva* Bormans, Notes Leyden Mus., VI, p. 183, (1884). [♀; Sidjoendjoeng, Sumatra.] I have before me a pair of this species from the Tengger region of Java, determined by Burr and from his series.

more cribroso-punctulate surface of the elytra and wing-scales, more elongate female pygidium and different armament of the forceps of that sex, as well as in the general paler coloration.

From *S. villica* Burr [5] the present species differs in the much greater size, the more longitudinal pronotum, the uniform coloration, instead of contrasted black of the elytra and wing-scales and of the base of the abdomen, and doubtless numerous other features which will be evident only when females of these two geographically widely separated species are compared. From the Belgian Congo *S. testacea* Borelli [6] the present insect differs in its larger size, in the truncate, instead of emarginate and laterally pointed, distal margin of the female pygidium, and in the details of the form of the forceps and of the anal segment of the same sex.

Type.—♀; Suva, Viti Levu, Fiji Islands. November 3, 1899. [Academy of Natural Sciences of Philadelphia, Type no. 5725.]

Size medium (for genus); form as usual in genus, slightly broader at caudal third of abdomen than across elytra, body appreciably depressed; surface of caudal section of pronotum, all of elytra and wing-scales and surface of abdomen exclusive of anal segment finely and coriaceously, and almost shagreenously, cribroso-punctulate, remainder of body surface glabrous or subglabrous; a vesture of fine hairs of moderate length covers most of both the dorsal and ventral surfaces of the body, sparser on the head and limbs, virtually absent from the anal segment, individual hairs more spaced and longer on the forceps.

Head cordiform in outline, the greatest breadth across genae and eyes equal to slightly more than six-sevenths the median length of the head (as 37 to 42), occipital outline rather strongly and broadly obtuse-angulate emarginate, caudal angles of genae broadly rounded, the head narrowing slightly in caudal fifth as seen from dorsum; eyes not at all prominent, in length but four-fifths as long as the postocular portion of the genae; surface of occiput rounded subdeplanate both transversely and longitudinally, transverse arcuate impression very shallow, caudal medio-longitudinal one more distinct and broadly impressed; antennae incomplete, but nine articles remaining, the proximal twice as long as the third, fourth and following ones elongate moniliform, averaging three times as long as their greatest breadth.

Pronotum with greatest breadth, which is at caudal third, equal to four-fifths of median length (as 32 to 40), the cephalic breadth slightly less (as 30); cephalic margin bisigmoid, moderately produced mesad to the rather narrow cervix, lateral portions of cephalic margin subobliquely subconcave,

[5] Ann. So. Afr. Mus., x, p. 8, figs. 4a–4b, (1911). [♂; Dunbrody, Cape Colony, South Africa.]

[6] Rev. Zool. Agr., xi, p. 423, (1923). [♀; Moto, Upper Uele, Belgian Congo.]

Figure 1.—*Sphingolabis auricoma* new species. Suva, Viti Levu, Fiji Islands. Dorsal view of female type. (× 4.)

latero-cephalic angles narrowly rounded subrectangulate, lateral margins straight, faintly diverging caudad to the very broadly and equally rounded caudo-lateral angles and caudal margin; surface of disk shallowly and convexly inflated in cephalic half, passing into a distinctly deplanate caudal section, which latter extends to a narrowing degree latero-cephalad of the more inflated area, a faint medio-longitudinal sulcation extends over cephalic two-thirds of pronotum, and the lateral margins are narrowly but distinctly elevated cingulate, this becoming obsolete caudad.

Elytra with greatest (median) length nearly 1.75 times as long as pronotum, the length caudad of the latter (along sutural margin) in virtually the same ratio, their median length equal to 2.46 the greatest breadth of a single elytron; lateral margins as seen from dorsum nearly straight and subparallel, the latero-cephalic angles broadly rounded, distal margin straight oblique, meso-caudad in trend. Wing-scales projecting distad of elytra a distance equal to approximately half the median tegminal length, external margins obliquely caudad converging in proximal half, thence broadly arcuate to the narrow transverse distal extremity.

Abdomen moderately broadening from base to middle, thence subequally wide to base of anal segment, breadth at middle equal to slightly more than half of full abdominal length exclusive of anal segment (as 55 to 100); lateral folds weakly and briefly indicated distad on third and fourth tergites;

anal segment transversely rectangulate, its greatest breadth faintly less than that of the abdomen, the segmental median length but faintly less than half the breadth of the same (as 25 to 53), lateral borders straight and subparallel, distal margin very shallowly and broadly concave between the forceps bases and more distinctly concave over the external two-thirds of these bases, dorsal surface of anal segment very shallowly and broadly impressed mesad, this not reaching the base and broadening distad, with an additional shallowly and narrowly impressed line, laterad and in line with the external base of the forceps is present a pronounced and elevated but transversely rounded sublinear fold, which is marked at the distal margin but becomes subobsolete proximad, marked off from the general surface of the segment by an internal bordering linear concavity: forceps approximately three-fourths as long as the normally exposed section of the abdomen, relatively stout, nearly straight except for the rather briefly recurved apices, proximal three-fifths broader and heavier than the more tapering two-fifths distad of the internal tooth, proximad in transverse section depressed triquetrous, deplanate ventrad, the latter tendency evident to the apices, dorso-external surface longitudinally subconcave, this broadening proximad but evident to the immediate apices, the bordering external margin being rounded subcingulate, while immediately proximad the concave surface has a low rounded node, proximo-external base of forceps slightly recurved subangulate and slightly thickened, ventro-internal margin of forceps sublamellate in proximal two-fifths, in median fifth more definitely lamellate, terminating at three-fifths of length in a relatively stout dentiform angle, immediately proximad of which this margin is shallowly concave to a faint lobulation, whence it is straight to a regular concavity near the base, apices relatively stout and briefly subfalcate, narrowly overlapping: pygidium but slightly more than a fifth as long as the forceps, 1.5 times as long as broad at apex, in outline roughly spool-shaped, its distal extremity sharply transverse truncate, the lateral margins briefly straight and subparallel proximad and distad, concave mesad, this producing the general strangulate form, proximal breadth faintly less than the distal, dorsal surface of pygidium strongly concave in profile and sharply ascending to the relatively deep base, distal border relatively thin and transversely sublamellate, ventral surface deplanate: subgenital plate transverse, its breadth twice the median length, distal margins with lateral sections oblique subarcuate, median portion very shallowly concave.

Femora moderately robust and inflated, the cephalic pair more strongly so than the others, all weakly compressed; cephalic femora slightly shorter than the pronotum (as 30 to 35); tibiae inflated, appreciably compressed, greatest depth of all at proximal two-fifths of length, unequally fusiform in profile outline, dorsal surface of distal half broadly but shallowly depressed within lateral bounding margins, cephalic tibiae but slightly shorter than femora (as 28 to 30); caudal tarsi with metatarsus virtually equal to length of other articles combined (as 14 to 13), ventral margins of all metatarsi with well-spaced series of chaetiform spines.

Coloration.—Base color of head, pronotum, elytra, wing-scales and abdomen walnut brown paling on head to hazel and progressively darkening distad on abdomen to liver brown on anal segment, limbs honey yellow, forceps and pygidium hazel, former becoming mummy brown at apices, washed with same along ventro-internal margin, antennae clay color, eyes bister, vesture golden yellow.

Measurements.—Length of body (exclusive of forceps or pygidium), 14.1 mm.; length of pronotum, 1.9; median length of elytron, 3.2; internal length of exposed wing-scale, 1.7; length of forceps, 4.2; length of pygidium, .9.

The type of this very distinctive species is unique.

Chelisochidae

Chelisoches morio (Fabricius)

1775. [*Forficula*] *morio* Fabricius, System. Entom., p. 270. ["Insula Otaheita maris pacifici" [Tahiti].]

Gilbert Islands: no exact locality; 1 ♂; [A.N.S.P.].

Horn Islands: Uvéa Island; VI, 14, 1938; (L. Macmillan); 3 ♂, 6 ♀; [A.M.N.H. and A.N.S.P.].

Fiji Islands: Suva, Viti Levu Island; XII, 24, 1897–I, 10, 1898; (A. G. Meyer); 1 ♀; [A.N.S.P.].

Tonga Islands: Tongatabu Island: XI, 30, 1899; 1 ♂; [A.N.S.P.].

New Caledonia: Bourail; 1902; (H. Méray); 1 ♀; [A.N.S.P.].

Cook Islands: Puka Puka Island; IV, 9, 1933; (M. Willows, Jr.); 1 juv.; [Calif. Acad.].

Taumotu Islands: Fakarava Island; X, 13, 1899; 1 ♂; [A.N.S.P.]. Pitcairn Island; XII, 23 and 28, 1934; (Crocker Exped.); 1 ♂, 1 adult minus apex of abdomen; [A.M.N.H.].

The males of this widely distributed and variable Indo-Pacific species here recorded, exhibit the same plasticity in the exact form of the forceps as is found in those from other Pacific localities being recorded elsewhere.

The extremes in size in the Uvéa Island representation show the following size range in that limited area: ♂♂, length of body exclusive of forceps, 16.6 and 18.7 mm.; length of forceps, 7.8 and 8.9. ♀♀, length of body exclusive of forceps, 14.3 and 17.6 mm.; length of forceps, 4.9 and 7.3.

All specimens above recorded have their perfect antennae with a definite pale annulus. None of them is in the brownish phase occasionally seen in the species.

The above records are the first for the species from the Gilbert, Horn and Cook groups, as well as from Tongatabu and Fakarava.

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NOTES ON SOME NORTH AMERICAN LEPIDOPTERA REARED ON SWEET FERN (COMPTONIA ASPLENIFOLIA LINNAEUS) WITH DESCRIPTION OF NEW SPECIES

By Emlen P. Darlington

New Lisbon, Burlington Co., New Jersey

(Plate II)

The host is a sweet-scented fern-like shrub, common in dry sandy areas of the "Pine Barren" region of southern New Jersey, a variety of *Comptonia peregrina* Linnaeus; the genus, a monotypic one, of eastern North America.

The only references given are those annotating this paper.

The species are generically placed and numbered according to the McDunnough Check Lists of the Lepidoptera of Canada and the United States, 1938–1939.

Sphingidae

Dolba hylaeus Drury 703

1909. *Dolba hylaeus* Smith, Report N. J. State Mus., Ins. of N. J., p. 429.
1913. *Dolba hylaeus* Holland, Moth Book, p. 46.

The food of this species seems to vary considerably; Smith records it on sweet fern. The common food is reported as papaw. I have not taken the species in New Jersey, but have taken it at light in Florida.

Sphinx gordius Cramer 728

This is the "Sweet Fern Sphingid" and can be found feeding throughout the summer.

Phalaenidae

Catocala antinympha Hubner 3316

I have found the larva feeding as late as October 20. Pupation in a cocoon in the loose soil and trash.

Geometridae

Nemoria rubrifrontaria Packard 4049

1876. Packard, Monograph Geom., Rept. U. S. Geol. Surv. Terr., vol. x, pp. 386–387.

The larva, which is quite peculiar, is fully described by Packard, also the pupa and moth. Packard says: "It was found at Princeton, Mass., Aug. 24, feeding on *Comptonia asplenifolia*. On the fourth of September it began to make a cocoon." It is evidently two-brooded as I have found mature larvae in loosely webbed terminal leaves on July 21, imagoes by July 31. F. M. Jones presented the Academy with specimens he had reared on sweet fern on Martha's Vineyard, Massachusetts.

Cosymbia myrtaria Guenee 4209

1876. *Ephyra myrtaria* Packard, Monograph Geom., Rept. U. S. Geol. Surv. Terr., vol. x, pp. 364–365.

This, or the following species, may be the one commonly referred to as *Cosymbia lumenaria* Hubner, which McDunnough fails to recognize in his 1939 Check List.

Cosymbia pendulinaria Guenee 4211

1876. *Ephyra pendulinaria* Packard, Monograph Geom., Rept. U. S. Geol. Surv. Terr., vol. x, pp. 363–364.
1909. *Cosymbia lumenaria* Smith, Report N. J. State Mus., Ins. of N. J., p. 498.
1913. *Cosymbia lumenaria* Holland, Moth Book, plate xliii, fig. 12.
1930. *Cosymbia lumenaria* Comstock, Introduction to Ent., p. 666.

This species no doubt varies in color and pattern according to its food. I have reared a light form on sweet fern at New Lisbon, which as adults emerged on July 27 and on September 21; there are at least two broods. The pupa is attached to a leaf in the feeding area. Frederick Lemmer reared a dark form on sweet fern at Lakehurst, New Jersey.

Synchlora sp.

For two years I have found a few larvae of the genus *Synchlora* feeding on the leaves of sweet fern but have not been able to obtain pupae. The larva resembles that described by Packard (Monogr. Geom., Rept. U. S. Geol. Surv. Terr., vol. x. 1876, p. 380) as *Synchlora excurvaria,* but differs in color of body and tubercles. The body of our species is brown, thickly spotted with yellow-tipped spicules. The "flap-like" dorsal tubercles are dark brown and are not tipped with yellow; there are small mid-dorsal spine-like tubercles on each segment. Length, 21 mm. *S. excurvaria* was described from Texas, the food *Rudbeckia nitida.*

Cleora sublunaria Guenee 4876

Reared on sweet fern by Frederick Lemmer at Lakehurst, New Jersey. Taken on the wing from early April to late May.

Pseudoboarmia buchholzaria Lemmer 4881

1937. *Pseudoboarmia buchholzaria* Lemmer, Bull. Brooklyn Ent. Soc., XXXII, pp. 24–25.

Reared on sweet fern by Frederick Lemmer. Type locality, Lakehurst, New Jersey. Taken on the wing from April 16 to August 10.

Tetracis lorata Grote 5198

1876. *Tetracis lorata* Packard, Monogr. Geom., Rept. U. S. Geol. Surv. Terr., vol. x, pp. 547–548.

1909. *Sabulodes lorata* Smith, Report N. J. State Mus., Ins. of N. J., p. 508.

Packard differentiates *T. lorata* from *T. crocallata.* Smith records it as feeding on *Comptonia asplenifolia.*

Other Geometridae have been found feeding on sweet fern, but being unsuccessful with their rearing I have not been able to determine the species.

MEGALOPYGIDAE

Lagoa crispata Packard 5286

While this is a common feeder on blueberry, it has been found feeding on sweet fern growing among the low bush blueberries.

Pyralidae

Acrobasis comptoniella Hulst 6104

1890. *Acrobasis comptoniella* Hulst, Trans. Am. Ent. Soc., xvii, p. 125.
1923. *Acrobasis comptoniella* Forbes, Cornell Univ. Agr. Exp. Stat., Memoir 68, p. 618.

The tough, roomy, silk-lined cases are conspicuous in the terminal shoots of sweet fern. Pupation started June 3, with emergence June 20 to July 6.

Olethreutidae

Exartema electrofuscum Heinrich 6665

1923. *Exartema electrofuscum* Heinrich, Proc. Ent. Soc. Wash., xxv, p. 110.
1926. *Exartema electrofuscum* Heinrich, U. S. Nat. Mus. Bull., 132, p. 139.

Type locality.—Lakehurst, New Jersey, "on Sweet Fern." Not finding it common, I have only one reared specimen, emerged July 2. Heinrich does not mention the bluish scales, very noticeable in the white areas.

Olethreutes cespitana Hubner 6728

1865. *Sericoris instrutana* Clemens, Proc. Ent. Soc. Phila., v, p. 135.
1926. *Olethreutes cespitana* Heinrich, U. S. Nat. Mus. Bull. 132, p. 179.

Specimens compared with Clemens' type were reared from larvae webbing the tips of sweet fern, June 6. Imagoes July 2. On the wing June 1 to late August. This seems to be a case of vicarious feeding, as the larvae were only found on sweet fern growing among the more acceptable food, the low bush blueberry.

Strepsicrates smithiana Walsingham 6769

1895. *Paedisca smithiana* Walsingham, Trans. Ent. Soc. London, p. 506.
1903. *Phyhinolophus indentanus* Dyar, Proc. Ent. Soc. Wash., p. 306.
1923. *Strepsicrates indentana* Heinrich, U. S. Nat. Mus., Bull. 123, p. 32.
1923. *Strepsicrates indentanus* Forbes, Cornell Univ. Agr. Exp. Stat., Memoir 68, p. 436.

The food plant of this species is given as *Myrica.* Along the southern coast of New Jersey, where *Myrica carolinensis* is abundant, I have found the larvae webbing the tender young shoots; inland in the New Lisbon area, where *M. carolinensis* is more scattering, I have not found the larva on *Myrica,* but in a few

cases on *Comptonia asplenifolia,* where it works in a similar manner, webbing the tender foliage. The moths I have reared on *Myrica* are in varying shades of brown and russet, the russet most pronounced on the costa; the ones reared on *Comptonia* are much darker, mostly purple-slate intermixed with russet scales that are barred with black, and without distinctive shading on the costa; the gray-white dorsal pattern is the same in both reared series, as are also other special characters. The white scale-tuft (noticeable in the male), at one-third the wing length, is on the lower edge rather than in the fold; the large costal fold of the male is noticeable only on the under side of the wing. There are at least two generations, with imagoes in May, June and July, again in September and October. Expansion, 13–14 mm.

Gypsonoma blakeana Grote 7058

1864. *Anchylopera fasciolana* Clemens, Proc. Ent. Soc. Phila., vol. III, p. 511.
1873. *Penthina blakeana* Grote, Bull. Buffalo Soc. Nat. Sci., vol. I, p. 91.
1923. *Gypsonoma fasciolana* Heinrich, U. S. Nat. Mus. Bull. 123, p. 163.
1947. *Gypsonoma fasciolana* Darlington, Trans. Amer. Ent. Soc., LXXIII, p. 95.

Based on the descriptions of the two species, I cannot reconcile the synonymy. One specimen I reared from larva webbing the young tips of sweet fern agrees with Grote's description, with more emphasis on the "pink hue" in the white interspaces between the fasciae, which is noticeable only in fresh specimens. There is no indication of a "golden hue" as described by Clemens. The ocellus is pinkish and somewhat silvery, and contains some small black markings. Clemens makes no mention of the "large brown basal patch," which is present in all the specimens I have seen, and the "median dark brown oblique continuous band is toothed outwardly at the center," more or less, as stated by Grote. Specimens from Maine, Pennsylvania and New Jersey agree with this description.

The type of *Anchylopera fasciolana* Clemens is apparently lost.

TORTRICIDAE

Sparganothis sulfureana Clemens 7349

1860. *Croesia? sulfureana* Clemens, Proc. Acad. Nat. Sci. Phila., p. 353.

In 1864 Clemens redescribed this variable species under three different names. It will feed on most any plant, including sweet fern.

Archips georgiana Walker 7385

1873. *Tortrix georgiana* Grote, Buffalo Soc. Nat. Sci., Bull. 1, vol. I, p. 15.

A general feeder that I have reared on such unrelated plants as *Comptonia, Vaccinium, Quercus, Lespedeza,* and *Sassafras.* The larva ties the terminal leaves of sweet fern; pupation in the feeding area by June 20; the pupal case is translucent and slightly greenish, especially at the cephalic end; imagoes by June 24.

Peronea kearfottana McDunnough 7509

1934. *Peronea kearfottana* McDunnough, Can. Jour. Res., vol. II, p. 318.—Can. Ent., LXVII, 1935, p. 148.—Can. Ent., LXXII, 1940, p. 61.

Recorded as a tier of the terminal shoots of sweet fern. McDunnough (Can. Ent., LXVII, 1935, p. 148). "A long series was bred by me in 1944 from larvae found on Sweet Fern at Annapolis Royal, N. S.; the moths emerged in early July." I have not taken it on sweet fern in New Jersey, but have reared what appears to be an identical species webbing the terminal leaves of *Kalmia angustifolia.* Pupation was mostly in the feeding area. Imagoes of the summer brood, July 12 to 28; fall brood, October 21 to November 4. The species closely resembles a common feeder on cranberry, *Peronea minuta,* but is slightly larger. Expansion, 14 mm.

GELECHIIDAE

Telphusa aethiops Westwood 7932 (Pl. II, fig. 1.)

1878. *Gelechia quinquecristatella* Chambers, Bull. U. S. Geol. Surv. Terr., IV, p. 88.

1903. *Telphusa quinquecristatella* Busck, Proc. U. S. Nat. Mus., XXV, no. 1304, p. 785.

1923. *Telphusa quinquecristatella* Forbes, Cornell Univ. Agr. Exp. Stat., Mem. 68, p. 292.

Forbes records it as "a bud worm on huckleberry," and, "What is apparently the same thing also occurs on Comptonia."

To elucidate on Chambers' description.—Face and head mottled gray. Palpi rough-scaled, second joint somewhat brush-like, gray and tipped with black scales. (Chambers says: "incrassate towards their apices, but not at

all brush-like.") In our specimens the third joint is approximately as long as the second; it is banded in black and gray, a few dark scales at the base, then a band of gray, merging into an irregular band of black scales at the middle, shading then into gray, with a band of black scales at three-fourths; the extreme tip is gray. Antennae rather thick and slightly rough-scaled, about three-fourths the wing length, scape a little darker than the shaft. Vertex mottled dark gray, with a smooth hood-like vestiture in the male and a cape-like vestiture covering the thorax and extending over the base of the forewings.

Forewings dark to reddish brown over a white base; at about one-fourth there are three blackish tufts, a small one on the costa, a larger one above the fold and a still larger one below the fold; at about one-half the wing length there are two blackish tufts, one above the fold and one below; at three-fourths there is a perpendicular ill-defined fascia of tufts; beyond this fascia the basal white scaling is slightly more pronounced. Between and surrounding the scale tufts is an intermixture of bronze scales iridescent in a good light; this iridescence is noticeable in all specimens, even on the antennae of some. Cilia at the apex streaked with black and tipped with white, becoming gray on the dorsal margin with the white tipping more pronounced. The male has a subcostal brush on the underside of forewing.

Abdomen silvery scaled above, with marked shingling of the vestiture, especially in the male, yellowish beneath, the segments with dark lateral margins especially in the male; anal tuft long-haired with lateral brush-like bristles. Fore and middle legs black, white scaled at the joints; posterior tibiae clothed with long gray hairs, yellowish-white at the joints. Expansion, 10 mm.

In the Philip Laurent collection, presented to the Academy of Natural Sciences of Philadelphia, is a specimen labeled by A. Busck in 1903, "*quinquecristatella* Chambers"; this specimen agrees with ones I have reared, webbing the tender growth on sweet fern. Pupation was on the sleeve of the cage in late May; imagoes June 12 to 20. A female was reared on sweet fern in Essex County, New Jersey, June 18.

On May 27, 1934, a species of the genus *Telphusa* was reared on sweet fern; its general characters distinguish it from *quinquecristatella* but as I have no further records and have never reared its like again, it may be only an anomaly.

Gelechia trialbamaculella Chambers 7965

1875. *Gelechia trialbamaculella* Chambers, Cinn. Quart. Jour. Sci., vol. II, p. 250.
1903. *Gelechia trialbamaculella* Busck, Proc. U. S. Nat. Mus., XXV, p. 858.
1923. *Gelechia trialbamaculella* Forbes, Cornell Univ. Agr. Exp. Stat., Mem. 68, p. 265.

1928. *Gelechia trialbamaculella* Franklin, Mass. Agr. Exp. Stat., Bull. 239, pp. 16–17.

A somewhat general feeder, common on Vacciniums. On sweet fern the adult larva webs two or more terminal shoots together to form a two-inch feeding tube, especially noticeable in October and November; it will feed as long as the foliage remains attractive; some over-wintering larvae will feed again in the spring. To cranberry and blueberry growers it is known as the Red-striped Fireworm, a very descriptive term, as the mature larva has a dorsal, and three more-or-less clearly defined lateral, red or pink stripes. To quote Henry J. Franklin (an authority on cranberry insects): "The newly-hatched larva is pale greenish yellow, with the head and cervical shield brown. As it grows its head becomes yellowish, and dull reddish lines appear running the length of the back and sides. The mature worm is fully three-eighths of an inch long and is more slender and agile than other fireworms. All the worms that hatch in June pupate in their nests after mid-July, the moths emerging at the end of July and early August. Most of those that hatch after the first of July continue as worms till the following May. The insect is therefore partly one-brooded and partly two-brooded."

Both Busck and Forbes describe either an immature larva, or other than the normal larva, found on sweet fern or the Vacciniums.

Larvae feeding on other species of plants may differ in coloration and striping, and still produce moths indistinguishable from ones reared on sweet fern or the Vacciniums. Until color and striping of the larva differentiate the species we will call them all, *trialbamaculella*.

Gnorimoschema confusatella new species (Pl. II, fig. 2.)

Face and vertex mottled grayish-white, each gray scale having a dark elliptical apex. Palpal brush black, flecked with white, white-scaled on the inner side; third joint black-scaled, flecked with white, not ringed. Antennae black, flecked with white, scape edged with white.

Forewings marbled in white, black and tan, costal edge dark especially at the base, then an intermixture of white and tan scales, with a predominance of tan in the crease; some white scaling beyond the center of the wing above the fold; dark-scaled in and below the fold; towards the apex there is a

tendency for the veins to be outlined with dark scales, with tan-colored scales between. In very fresh specimens the dark scales in the fold and on the dorsum have a slight bluish tint. The maculation would no doubt vary in a large series. Cilia white, the inner scales dark-tipped. Hindwings with a mottled silvery-gray appearance, produced by the whitish-gray scales having dark elliptical apices; beneath, the fore- and hindwings have this same mottled appearance.

First two abdominal segments bright yellow above, the third partially so; the next three segments are dark-scaled at the base and white-scaled beyond the middle; beneath, the segments are marbled black and white, with heavy black scales at the sides.

Fore and middle legs heavily mottled with black especially on the outer side, some white scales at the tarsal joints; anterior and middle aprons mottled like the legs, with white scales at the apices; posterior apron much lighter-scaled; hind tibiae mostly black-scaled on outer side, yellowish white on the inner side, heavily tufted above. Expansion, 16 mm.

Type no. 7811, Academy of Natural Sciences of Philadelphia, also one female paratype.

Type locality.—New Lisbon, New Jersey.

The larval work resembles that of *Gelechia trialbamaculella,* as described in this paper, and the webbed nests were gathered November 20th and put away, thinking it was the work of this species; on May 21st following, two naked pupae were recovered and on June 6th and 7th the two specimens herein designated as type and paratype were reared; the larvae were not seen.

Dichomeris bipunctellus Walsingham 8306

1882. *Ypsolophus bipunctellus* Walsingham, Trans. Amer. Ent. Soc. Phila., x, p. 186.

Reared from larvae in webbed nests in terminal shoots of sweet fern. Imagoes, July 3 to 9.

Oecophoridae

Agonopterix fernaldella Walsingham 8443

1889. *Depressaria fernaldella* Walsingham, Insect Life, vol. I, p. 256.
1902. *Depressaria walsinghamella* Busck, Proc. U. S. Nat. Mus., vol. XXIV, p. 739.
1941. *Agonopterix walsinghamella* Clarke, Proc. U. S. Nat. Mus., vol. XC, pp. 78–79.

Clarke gives the food as *Myrica asplenifolia* L. A. E. Brower has reared the species on broad-leaved aster at Bar Harbor, Maine,

emergence September 15. I have reared the species from larva between two attached leaves of sweet fern, emergence August 15.

Blastobasidae

Pigritia sp.

One specimen of an undetermined species reared from a larva on sweet fern, emergence August 14, 1941.

Coleophoridae

Coleophora comptoniella McDunnough 9089

1926. *Coleophora comptoniella* McDunnough, Can. Ent., LVIII, p. 218.
1933. *Coleophora comptoniella* McDunnough, Can. Ent., LXV, p. 163.
1946. *Coleophora comptoniella* McDunnough, Can. Ent., LXXVIII, p. 13.

Looking closely in late October or early November, one may notice that some of the sweet fern leaves appear to be bleached; turning the leaf over one will see a tiny hole near the center of a pinnule where the larva has fed; sucking one pinnule dry it goes to the next and continues feeding until late fall, when it becomes dormant. There is some erratic feeding in the spring and a long pupal stage from late May, through June and into July. Imagoes, July 18 to August 4. Forewings whitish at base and along the costa, the tan or "golden-brown" color becoming more pronounced as the apex is reached; cilia light tan. Hindwings and cilia light tan.

Gracillariidae

Lithocolletis comptoniella new species (Pl. II, figs. 3 and 4.)

Face and palpi shining white. Vestiture tipped with saffron. Antennae whitish, annulate with narrow saffron rings. Thorax and forewings reddish saffron. A white band extends across the anterior margin of the thorax, passes over the patagia and merges with the basal streak of the forewing: this white, rather wide, basal streak in the fold is unmargined, and ends well before the first fascia. On the dorsal margin is a basal streak of varying size. The comparatively broad white fascia at about the middle of the wing is outwardly curved and margined on the inner side by a single row of black scales; beyond this there are three small but clearly defined white costal dashes or streaks; the first two are margined on the inner side by prominent black-tipped scales; the third is prolonged into the cilia and may be margined by two black scales. There are two dorsal streaks, the first beginning opposite the first costal streak and extending up to the middle

of the wing with its apex beyond that of the first costal streak, in most specimens; this first dorsal streak is margined on the inner side by prominent black scales; the second dorsal streak is a mere white dash extending into the cilia. It may be margined by a black scale or two. There is no apical dot. Hindwings dark gray, cilia much lighter.

Hind tibiae flecked with dark gray, more white beneath. Tarsi unspotted. Average expansion, 6 to 7 mm.

Type, no. 7808, Academy of Natural Sciences of Philadelphia, also male and female paratypes.

Type locality.—New Lisbon, New Jersey.

The larva places this species in the first group of this genus; it is cylindrical, yellowish in color, with prolegs on abdominal segments 7, 8, and 9; none could be detected on 13.

There are two generations a year as attested by rearing, though work of the first will scarcely be detected in the field. Imagoes appeared over caged plants from the last of June to July 21 when the last emerged. Work of the second generation is quite noticeable in an average year, and is detected by the blanched condition of the folded-under pinnule that is mined.

Pupation in the mine from late October through November; 200 mines examined during November showed one-third contained viable pupae, one-third were empty and one-third contained parasitized larvae.

The species is obtainable wherever the host plant grows in southern New Jersey.

Callisto (Parornix) peregrinaella new species (Pl. II, figs. 5 and 6.)

Face usually all white. Labial palpi pearly white, often spotted with black on under side of third segment. Vestiture white to grayish-white, intermixed with black on the vertex. Eye facets black. Antennae dark above, becoming lighter beneath especially towards the base, annulations gray; the terminal segments show a tendency to pectination.

Forewings without appreciable lustre; scales dark-tipped on a white base, darkest in the fold and whitest beneath along the dorsal margin, where a mid-dorsal patch of white scales often extends up to and beyond the fold. The costal striae at the base are ill-defined or nonexistent, becoming pronounced just beyond the middle of the wing, where the first of five clear white striae begins; these striae vary in length and intensity but seldom extend more than a third across the wing, the second one being generally more extensive; the terminal one is prolonged into the cilia, forming a white triangle which encloses a very dark scaled apex. Cilia with three rows of dark-tipped scales, the inner one wide, the other two narrow.

Abdomen uniformly dark-scaled with slight metallic lustre, under side with yellow-tipped scales.

Fore legs black, with yellowish tarsi having black-tipped joints. Hind legs yellowish and black, without uniformity. Expansion, 8 mm.

Type no. 7809, Academy of Natural Sciences of Philadelphia, also male and female paratypes.

Type locality.—New Lisbon, New Jersey.

The larva mines a terminal leaf of sweet fern, causing the pinnules to fold over into a feeding tube; the larva feeds down the leaf and, when mature, leaves its feeding tube, wanders, and finally pupates under a folded-over pinnule, in the same manner as *Lithocolletis comptoniella* pupates, and from which it can hardly be distinguished. Larvae in June and again in October and early November. The mortality is very high; very few larvae or pupae can be found at any time although the feeding-tubes are in evidence.

Gracilaria asplenifoliatella new species

Face straw yellow. Maxillary palpi prominent and colored as the face. Labial palpi, light straw above, ochreous beneath. Antennae broadly annulate with dark and light scales. Thorax concolorous with the forewings.

Forewings shining red-ochreous, intermixed with some yellow scales, and having a strong purplish iridescence: some specimens are uniformly colored, others are more or less yellow along the costa, with a few scattered dark points along the costal margin. Cilia around the apex generally concolorous with the wing, becoming much lighter on the dorsum. Hindwings slate colored, with pale cilia.

Abdomen dark slate above with a silvery sheen, generally yellow on the sides and beneath, sometimes intermixed with slate.

Fore and middle legs purplish black, excepting the tarsi which are white with black-tipped joints; hind legs with grayish femora, especially on the anterior surfaces, with tibiae and tarsi light yellow, with black-tipped joints; in some specimens the legs are mostly all yellow. The surest way for determination is by rearing. The species belongs to the nearly smooth-scaled palpus group. Expansion, 11 mm.

Type no. 7810, Academy of Natural Sciences of Philadelphia, also paratypes.

Type locality.—New Lisbon, New Jersey.

The larva curls or rolls the tip of a sweet fern leaf from beneath, observable in early July, and as late as September 9th, when both young and adult larvae were found; when mature the larva leaves the rather extensive curl or roll, goes to another leaf, and pupates

under the usual split-capsule-like case on the underside of a pinnule. Imagoes reared from late July to late October; parasites emerged in October and in May of the following year.

Psychidae

Thyridopteryx ephemeraeformis Haworth 9519

This "bag worm" is so common in this locality that it feeds on any plant and has been taken on sweet fern.

Explanation of Figures

Plate II

Fig. 1.—*Telphusa aethiops* Westwood.
Fig. 2.—*Gnorimoschema confusatella* new species. Type.
Fig. 3.—*Lithocolletis comptoniella* new species. Type.
Fig. 4.—Leaf of sweet fern mined by larva of *Lithocolletis comptoniella* new species.
Fig. 5.—*Callisto peregrinaella* new species. Type.
Fig. 6.—Leaf of sweet fern mined by larva of *Callisto peregrinaella* new species.

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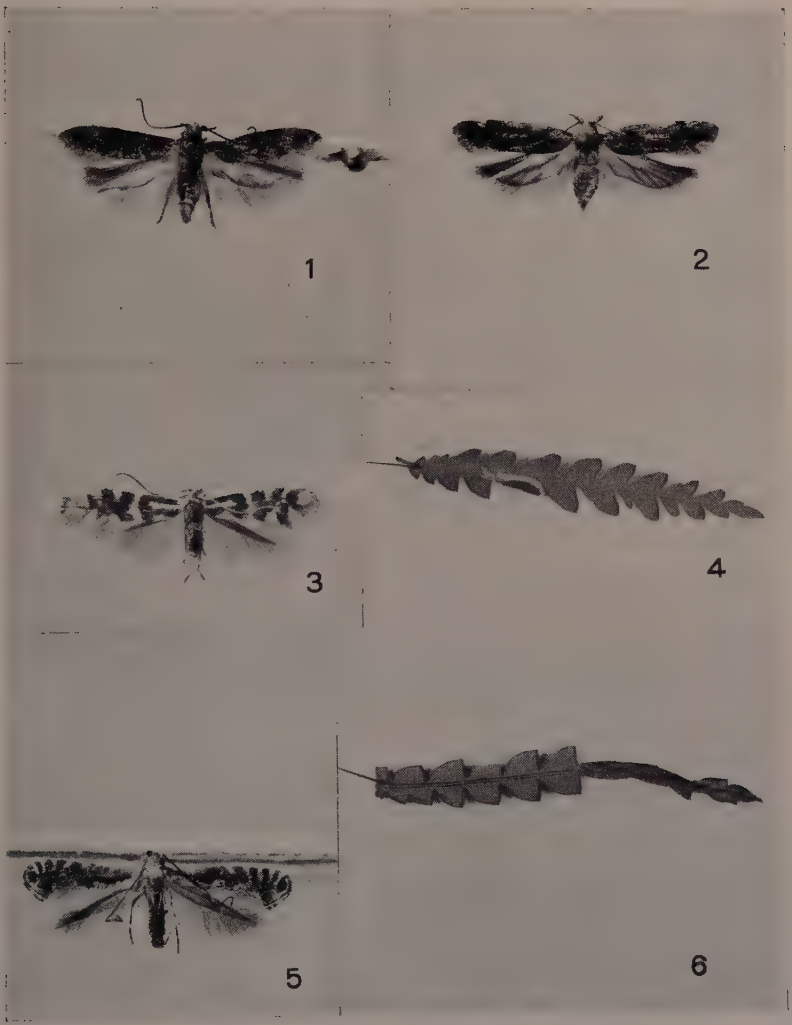

DARLINGTON—LEPIDOPTERA FROM SWEET FERN

DESCRIPTIONS OF NEW, AND CRITICAL NOTES ON PREVIOUSLY KNOWN, SPECIES OF AFRICAN MANTEIDAE (ORTHOPTERA)

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(Plates III to VI)

The following notes were made, and the undescribed species encountered, in the course of study of several quite extensive series of African Manteidae, the reports on which will appear at a later date. Twenty-one species, representing sixteen genera, are here discussed, seven being new, while the other observations placed on record bear upon proper generic positions, note variation within species, or give records amplifying or more clearly defining the known range of others. In addition to figuring all the new species described, illustrations are given for four previously described species which had not been figured.

The greater part of the material discussed is in the collection of the Academy of Natural Sciences of Philadelphia, with the remainder belonging to the American Museum of Natural History, to the officials of which latter institution I am indebted for the privilege of studying this and other material from their series. The ownership of the material discussed is indicated by the standard abbreviations of the names of the respective institutions.

EREMIAPHILINAE

HUMBERTIELLA Saussure

Humbertiella africana Rehn (Plate V, fig. 9.)

1912. *Humbertiella africana* Rehn, Archiv. für Naturg., LXXVIII, abt. A, heft 6, p. 106. [♀;Cameroons.]

This was the first species of the otherwise Oriental genus *Humbertiella* to be reported from Africa. Giglio-Tos [1] suggests

[1] Das Tierreich, lief. 50, p. 66, (1927).

that the specimen may have been erroneously labelled, which, of course, may be true, but Conradt's collecting in the Cameroons seems, as a whole, to have been correctly labelled. Again the steadily increasing number of orthopteroid genera being found common to the Oriental and the West African Forest regions tends to support the correctness of the labelling. In the Acrydiinae alone, in recent studies I have shown that the genera *Tefrinda, Loxolobus* and *Lamellitettix,* previously considered entirely Oriental, all occur as well in West Africa, and in each case on the basis of fully authenticated material taken by more than a single collector.

At the time *H. africana* was described I was unable to make physical comparison of its type with *H. indica* Saussure, with which I associated it. This I am now able to do, with an authentic female of *indica* received from the Geneva Museum (see plate V, fig. 10) and the type of *africana* before me. The pronotum is somewhat broader proportionately in *africana,* while its surface sculpture is appreciably more pronounced, except for the paired cephalad-diverging cariniform ridges on the prozona which are less sharply emphasized, the median and caudal limbs are more robust, the cephalic femora have the median line of tubercles on the external face composed of a greater number of vertically disposed cariniform instead of tuberculate points, while the cephalic coxae lack the transverse preapical blackish collar seen in *indica.* The tegmina also appear to be broader in *africana* than in *indica,* but curling in the available specimen of the latter prevents measurement.

THEOPOMPELLA Giglio-Tos

Theopompella congica new species (Plate III, fig. 1.)

This species is closely related to *T. heterochroa* (Gerstaecker),[2] with male and female Cameroons individuals of which it has been compared, but differs chiefly in the broader and squarer pronotum of the female, which has its breadth to length as 7.5 to 10, as against 7 to 11, the lateral margins of the pronotum being straighter and less arcuate and the lamellations of the lateral areas narrower, and not as regularly narrowing caudad as in *heterochroa.*

[2] *Humb*[*ertiella*] *heterochroa* Gerstaecker, Mitt. Naturw. Ver. Neu-Vorpomm. und Rügen, XIV, p. 80, (1883). [♂; Quaqua, Cameroons.]

The coloration is essentially as in *heterochroa,* although the blackish fuscous of the internal face of the cephalic femora is not narrowed at the sulcal groove, as in *heterochroa.*

Type.—♀; Medje, Kibali-Ituri District, Belgian Congo. (Congo Expedition; Lang and Chapin.) [American Museum of Natural History.]

Size and general form as in *T. heterochroa.*

Head definitely transverse, its greatest breadth across the eyes being slightly less than 1.5 times the depth mesad from the occipital line to the buccal extremity, the breadth faintly greater than the maximum width across pronotum (as 8 to 7.5); as seen in cephalic aspect the occipital line between the lateral lobate nodes is virtually straight, the lobes relatively broad and rounded but definitely developed, their axes markedly diverging dorso-laterad, the occipital interspace between the lobes subequal to three times the basal width of a single lobe, juxta-lobar sulci not definitely severing the dorsal line, subvertical, well impressed only briefly near the dorso-internal section of the eye margin; transverse supra-ocellar sulcus broad and low obtuse-angulate in outline; ocelli distinct but rather small, moderately elevated; facial scutellum strongly transverse, its greatest median depth contained almost four times in its greatest breadth (as 5 to 19), dorsal margin sigmoid, broadly convex arcuate mesad and concave in its lateral portions which are ventrad of the antennal bases, median section of surface somewhat protuberant, ventral margin broadly and entirely concave. Eyes prominent as usual in the genus, in latero-cephalic aspect their general outline is broad ovate, with breadth contained 1.4 times in the depth. Antennae setaceous, approximately 2.5 times as long as the pronotal disk.

Pronotum of the form usual in the genus, but relatively broader and squarer than in its nearest relatives, its greatest breadth, which is at cephalic third, being equal to three-fourths of the pronotal length, its lateral margins for the greater part of their length but weakly convex, definitely less so than in *heterochroa;* cephalic margin broadly arcuate-produced mesad, laterad concavely sinuate to the marked and subrectangulate latero-cephalic angles, caudal margin as a whole rather broadly arcuate, evenly rounding to the lateral margins without angulation, the supra-humeral sections of the caudal margin obscurely subsinuate, lateral margins with distinct but low and moderately spaced serrulations; lateral sections of surface as a whole lamellately depressed and not as broad as in *heterochroa,* not regularly narrowing caudad and with that portion of these flange surfaces in proportion relatively wide; medio-longitudinal collar and shaft sections of the pronotum moderately elevated, the principal transverse sulcus placed faintly cephalad of the cephalic third of the pronotum, well and sharply impressed, the greatest breadth of the elevated collar being slightly more than one-half of the greatest pronotal breadth, its lateral borders well defined by the encircling arms of the transverse sulcus, subarcuately converging cephalad to the

broadly rounded "prow" of the collar; at the middle of the length of the shaft there is a marked transverse virtually straight impression, which reaches completely across the shaft from one lateral flange to the other, while a medio-longitudinal sulcation extends with varying emphasis from the cephalic section of the collar to the caudal margin of the shaft, in the caudal fourth of the latter also bearing a median carinula, at the cephalic fourth of the shaft the surface bears a pair of widely-spaced pit-like depressions, immediately meso-caudad of each of which is placed a small low circular node, while the caudal margin of the pronotum bears a similarly spaced pair of somewhat larger but similarly rounded lobes.

Tegmina in general as characteristic of the genus, surpassing the apex of the abdomen by a distance equal to half the pronotal length, broad, the greatest breadth contained nearly 2.5 times in the tegminal length; costal margin arcuate in somewhat more than proximal two-thirds, definitely flattened in the middle of this arcuation, at distal third subconcavely emarginate and thence distad moderately arcuate to the relatively broad yet rounded-acute apex, sutural margin as a whole arcuate, flattened in the median third; marginal field with expanded proximal portion very broad, at its widest point (middle of tegminal length) equal to one-third of the entire tegminal breadth; venation of marginal field coarsely anastomosed, venation of discoidal field of the type characteristic of the genus, in the distal half with the intercalated secondary venation between the principal longitudinal veins and their rami showing the usual concentration of smaller areolae meso-longitudinally in each area. Wings briefly surpassing the apices of the tegmina, their immediate apices narrowly rounded rectangulate.

Cephalic coxae moderately robust, the cephalic margin with 3 to 5 spaced and quite small spinules proximad, distad with a number of more closely placed granules of even smaller size; cephalic femora 1.5 times as long as the cephalic coxae, of the stout form and subtrigonal cross-section characteristic of the genus, greatest depth at proximal fourth contained 3.9 times in the femoral length, external face with an irregular series of medio-longitudinally disposed acute tubercles, ventro-external margin with four large, well-spaced spines with an additional shorter one at the base of the genicular lobe, ventro-internal margin with 16 spines of alternating length, ungual groove deeply impressed, discoidal spines four in number; cephalic tibiae, including apical claw, approximately three-fourths as long as the femora, apical claw rather large, ventro-external margin with a series of five closely placed smaller spines proximad, succeeded by an interval and followed distad by a group of two to three large spines,[3] internal margin with 11 to 13 spines, progressively increasing in length distad and the more distal ones the largest of all limb spines except the tibial apical claw; cephalic

[3] The left hind limb has three, the right but two. However, the former seems the proper number, as three spines are normal in character and splay, i.e., essentially the same as those proximad on the same margin, while on the right tibia the more proximal of the two is directed more laterad and presumably has been subject to some developmental stress during the preceding instars.

tarsi five-sixths as long as the cephalic femora, the proximal article (metatarsus) comprising half the tarsal length and in form definitely arcuate in proximal half as seen in dorsal aspect, second and distal articles subequal in length. Median and caudal limbs as usual in the genus, quite similar in general characteristics, the femora subequal in length but the median is slightly the stouter, and with its ventro-external margin more definitely elevated and sublamellate than in caudal femora, median tibiae but two-thirds as long as the caudal tibiae but slightly stouter and subsinuate as seen in dorsal or ventral aspects, the caudal tibiae definitely more slender and straighter; caudal tarsi very slightly more than two-thirds as long as the caudal tibiae, the proximal article comprising slightly more than half the total tarsal length, distal article subequal in length to the second article from the base.

Coloration.—Base body color ochraceous-buff, tending areally toward pale ochraceous-orange, ventrad on limbs and coxae approaching pale honey yellow, the whole of the dorsal surface of the body and limbs clouded, blotched or sprinkled, as usual in the genus, with cinnamon-brown to prout's brown and mummy brown. Head with caudal aspect of occiput washed, and most of the face ventrad of ocelli clouded or suffused, with the darker tone, this involving the ventral portions of the eyes; antennae mummy brown with several proximal articles paler. Pronotum sprinkled or clouded with the darker tone. Limbs with dorsal aspect showing incomplete transverse dark barring on the femora, and deeper and more solid dark spaced blotches or annuli on the tibiae and tarsi. Ventral surface showing the following dark elements: transverse arcuate, rather narrow bar on prosternum immediately cephalad of the bases of the cephalic coxae; meso- and metasterna mars brown except for a pale median ovate (metasternal) or subovate (mesosternal) area; ventral surface of median and caudal femora almost uniformly pale, of tibiae with intimations of the dorsal banding, but not complete annuli, of tarsi with longitudinal dark streaking or (caudal metatarsus) definitely annulate; internal surface of cephalic coxae with a transverse proximal dark bar, internal surface of cephalic trochanters lightly washed with pale greenish; internal surface of cephalic femora with slightly more than the proximal half solidly dark, also the discoidal spines, while the external cephalic femoral and tibial spines are narrowly dark tipped, cephalic tarsi with each article narrowly dark margined distad. Abdomen with ventral surface largely cinnamon-brown, laterad each segment being broadly clouded with, and also sprinkled with dots of mummy brown, subgenital plate similarly darkened peripherally but its disk proximad paling to buckthorn brown, each abdominal sternite narrowly bordered laterad with ochraceous-buff; cerci proximad with each article finely annulate with ochraceous-buff, more distad almost solidly prout's brown. Tegmina with the characteristic light and dark cloudings found in all the species of this and closely related genera, the pale tone ranging from chalcedony yellow to pale lumiere green, the dark from deep maroon to bister, the distal third of the tegmina and wings

also tinted with kaiser brown, although this may not be natural but due to a stain. Wings solidly infumate with prout's brown to mummy brown.

Measurements.—Length of body, 49.5 mm.; length of pronotum, 11.2; greatest breadth of pronotum, 8.4; length of tegmen, 39; greatest breadth of tegmen, 18.4; length of cephalic femur, 14.9; length of cephalic tibia (including apical claw), 10.2; length of caudal femur, 16.6; length of caudal tibia, 18.

The type of this species is unique.

Dystactinae

ACHLAENA Karsch

Achlaena mutica Giglio-Tos

1915. *A*[*chlaena*] *mutica* Giglio-Tos, Bull. Soc. Entom. Ital., XLVI, p. 149.

[♂; Fernand Vaz, French Congo [= Gaboon].]

GABOON: Boué, Ogowe River; one male; [A.N.S.P.].

This individual differs from the male sex of *A. grandis* (Westwood), the genotype, in a number of respects, and also shows other features of discordance when compared with the original description of *mutica,* to which, however, I feel the specimen should be referred. From the description we note differences in the lateral points of the pronotal expansion being as subspiniform as in *grandis,* which may be explained by the type of *mutica* being abnormal in this respect, while the color is very strongly and completely infumate, instead of relatively pale as described. We know, however, color tone is a feature of individual variation in the male sex of *grandis.*

The pronotum of the species here considered *mutica* is slightly more slender than that of the same sex of *grandis,* now also before me, while the supra-ocellar triangles of the head are sharper and higher than in that species and the cephalic femora are slightly deeper.

The Boué individual measures as follows: length of body, 32.5 mm.; length of pronotum, 7.33; greatest width of pronotum, 2.77; length of tegmen, 32; length of cephalic femur, 7.33; greatest depth of cephalic femur, 2.6.

This is the only locality additional to that of the type from which the species is known.

MANTEINAE

POLYSPILOTA Burmeister

Polyspilota variegata (Olivier)

1792. *Mantis variegata* Olivier, Encycl. Méthod., Ins., VII, p. 638. [Sex ?; Angola.]

LIBERIA: Monrovia; April 16, May 8–20, June 24, August 25, November 15 and 28, 1920; (Otis W. Barrett, partly "at light"); eleven males; [A.N.S.P.]. White Plains; March 31, May 13 and July 1, 1920; (Otis W. Barrett, one in "open bush," one at "forest edge"); three females; [A.N.S.P.].
FERNANDO PO: one male, one female; [A.M.N.H.].

Of the Liberian series all three females and four of the males are in the brown phase, while seven of the males are in the green phase.

This is probably the most widely distributed species of mantid found in tropical Africa, on the west coast occurring north to Senegal, and also on the Cape Verde Islands and those of the Gulf of Guinea, i.e., Fernando Po, Sao Tomé, Principe and Annabón. Off the coast of eastern Africa its known insular distribution includes Zanzibar, Madagascar, the Aldabras, Assumption Island, Cosmoledo Island, Farquhar Atoll, Coetivy Island, the Seychelles, the Amirantes, Reunion and Mauritius.

Polyspilota ugandana (Rehn) (Plate V, fig. 11.)

1912. *Sphodromantis ugandanus* Rehn, Archiv. für Naturgesch., LXXVIII, abt. A, heft 6, p. 115. [♀; British Uganda.]

KENYA: Kisumu, Lake Victoria; May 24, 1930; (Dummer); one female; [A.N.S.P.].

This species was based on a unique female, which also is now before me. It was incorrectly referred to *Sphodromantis,* largely on account of the brevity and general shape of the pronotum, and a reexamination of the matter demonstrates beyond question that its generic position is as here given. Giglio-Tos disposed of *ugandana* by considering it a synonym of *variegata* (or *aeruginosa* as he preferred to call it), an action which is entirely unwarranted, as the available exceptionally large and comprehensive representation of the latter species proves. Instead *ugandana* is a distinct species, nearly related to *variegata* but separable by the more transverse head (ratio of depth to width as 37 to 50, as against 41 to 56 in *variegata*), the distinctly shorter and proportionately broader pronotum (as 14.5 by 5.25 at broadest point, as

against 19.5 by 6 in a representative female of *variegata*), the much less numerous and less regular cross venation of the discoidal field of the tegmina of the female, and the shorter and less attenuate limbs.

In color the Kisumu female is typical of the brown phase found in this genus, while the type is in the green phase.

The dimensions of the Kisumu female are as follows: length of body, 54.6 mm.; length of pronotum, 15.7; greatest width of pronotum, 5.9; length of tegmen, 35.2; length of cephalic femur, 12.7; length of caudal femur, 15.1.

Apparently *ugandana* is a species of the Lake Victoria region, as no evidence of its presence elsewhere has been noted. Future work should give us a better idea of the limits of its areal distribution.

TENODERA Burmeister

Tenodera superstitiosa (Fabricius)

1781. [*Mantis*] *superstitiosa* Fabricius, Spec. Ins., I, p. 348. [Sex?; Equinoctial Africa.]

LIBERIA: Monrovia; July 17 and August 10, 1920; (O. W. Barrett; at light); two males; [A.N.S.P.].

This widely distributed species of tropical and South Africa has been recorded from the west coast of Africa as far north as Portuguese Guinea and a number of the Cape Verde Islands.

EPITENODERA Giglio-Tos

Epitenodera capitata (Saussure)

1869. *T*[*enodera*] *capitata* Saussure, Mitth. Schweiz. Entom. Gesell., III, p. 69. [♀; unknown locality.]

ANGOLA: Chitau; August 1–12, 1925; four females; [A.M.N.H.].

This species, which is distributed from the Transvaal and Natal north to the Belgian Congo, Uganda and the Kilimanjaro region, has been recorded once previously from Angola, by Bolívar from Duque de Bragança. A male from Pretoria, Transvaal,[4] has been compared with the above reported females.

Epitenodera madimbana (Giglio-Tos)

1912. *T*[*enodera*] *madimbana* Giglio-Tos, Bull. Soc. Entom. Ital., XLIII, pp. 35 and 48. [♀; Madimba, (Lower Congo) Belgian Congo.]

[4] October 16, 1914; [A.N.S.P.]. Received in exchange from the British Museum of Natural History. Determined by Kirby.

There is before me, in the Academy series, a female individual from Zomba, Nyasaland, received in exchange from the British Museum of Natural History and determined as *capitata* by Kirby, whose long-hand label is still on the specimen. This is a typical individual of *madimbana,* having the large size and other features considered by Giglio-Tos to be characters of *madimbana,* which hitherto figures in the literature only on the basis of the unique type.

The measurements of the Zomba specimen are as follows: length of body, 102.5 mm.; length of pronotum, 33.6; length of metazona, 24.2; greatest width of pronotum, 7.8; length of tegmen, 77; length of cephalic coxa, 20.

SPHODROMANTIS Stål

Sphodromantis lineola (Burmeister)

1838. *M[antis (Sphodromantis)] lineola* Burmeister, Handb. der Entom., II, abth. II, pt. 1, p. 537. [Sex ?; Sierra Leone.]

LIBERIA: Monrovia; March 26, April 17 and 30, July 20, August 23 and November 10, 1920; (O. W. Barrett; taken at light, on low bush, in open bush and in open field); four males, two females; [A.N.S.P.].

UGANDA: Mabira Forest; November, 1920; (Dummer); one female; [A.N.S.P.].

ANGLO-EGYPTIAN SUDAN: Malakal, Upper Nile District; November 26, 1921; (C. H. Lankester); one male; [A.N.S.P.].

All the specimens above recorded are in the green phase. The Monrovia specimens agree in size with Cameroons individuals, while the Mabira female and the Malakal male are relatively small, showing the following dimensions (in millimeters): length of body, ♂, 58.5; ♀, 60: length of pronotum, ♂, 16.2; ♀, 18.5: greatest width of pronotum, ♂, 6.2; ♀, 8.6: length of tegmen, ♂, 48; ♀, 38.6: length of cephalic femur, ♂, 15; ♀, 18.9.

The Mabira and Malakal localities are the most eastern from which I have seen material of *lineola.* The records in the literature from eastern Africa of both this species and the related *S. gastrica* are greatly confused, and definite conclusions as to their respective ranges can be reached only from the actual material involved.[5]

Giglio-Tos has apparently been confused in his differentiation

[5] See Rehn, Ann. Transv. Mus., XII, p. 37, (1927).

of this species and *S. centralis* Rehn,[6] as in the Academy series, are one male and two females from Entebbe, Uganda, received in exchange from the British Museum of Natural History, all labelled by Giglio-Tos as *centralis*. With paratypes of *centralis* before me, the male examined by Giglio-Tos is seen to be that species, but the females represent *lineola*. While *centralis* has a localized range, it apparently occurs side by side with the more widely distributed *lineola*.

RHOMBODERELLA Giglio-Tos

I feel Giglio-Tos was perfectly correct in removing the genotype of this genus from the *Hierodula-Rhombodera* complex, as it is clearly evident the development of *Rhomboderella* has been through the African *Sphodromantis* line, rather than the Oriental one above-mentioned. Through species such as *Sphodromantis centralis* the evolution of *Rhomboderella* seems clearly evident. I feel, however, the group should have generic instead of subgeneric rank, and would place it, in a linear arrangement, after *Sphodromantis*.

Rhomboderella scutata (Bolívar) (Plate V, figs. 14 and 15.)

1890. *H[ierodula] scutata* Bolívar, Jorn. Scienc. Math. Phys. e Nat., Lisboa, (2) I, p. 83. [♀; Angola.]

ANGOLA: Palavange; November 2, 1930; (Second Prentiss Gray Afr. Exped., H. T. Green); one female; [A.N.S.P.]. Chitau; August 1–12, 1925; two males, one female; [A.M.N.H.]. Capelongo; July 25, 1925; one male; [A.M.N.H.].

The females agree very well with Bolívar's rather short original description, except that the Palavange specimen is appreciably smaller than the original measurements. The dimensions (in millimeters) of one of the males and both of the females are as follows:

	Length of body	Length of pronotum	Greatest width of pronotum	Length of tegmen	Length of cephalic femur
♂, Capelongo	53	15.9	10.6	52	14.9
♀, Chitau	60	18.6	12.4	44	18
♀, Palavange	53.5	16.5	11.5	41.5	16.2

[6] *Sphodromantis centralis* Rehn, Wissen. Ergebn. Deut.-Zent.-Afrika Exped. 1907–1908, V, Zool. III, lief. 1, p. 12. [♀; Andebali, southern Momvu (border of great forest west of Lake Albert), Belgian Congo (type loc.); Kwidjwi Island and Kissenge, Lake Kivu; west foot of Ruwenzori; forest north of Beni, Semliki Valley; Uganda.]

The males and the Palavange female are in the brownish phase, the female from Chitau is in the greenish phase, being a dull olive-green, without any indication of the tegminal nebulosity seen in the brownish individuals of both sexes.

The records of this species from Boko, Congo (Giglio-Tos, 1907) may, and those from various Nyassaland and Zambesi localities (Kirby, 1899) and Ujuji, Lake Tanganyika, Tanganyika (Giglio-Tos), in all probability, refer to a previously unrecognized species of the genus, which I am here describing from material which served as a part of the basis for Kirby's records.

Rhomboderella thorectes[7] new species (Plate V, figs. 12 and 13.)

When compared with the genotype *R. scutata* (Bolívar) this species is seen at once to differ in the distinctly broader and more ovoid pronotum, which also has a different character to its sculpture, and in the broader and more strongly arcuate marginal field of the tegmina. Material of this species has been recorded as *scutata* by Kirby, and other authors have similarly determined it. The possession of Angolan material of unquestioned *scutata* has permitted me to interpret the situation correctly.

Type.—♀; Central Zambesi.[8] [Academy of Natural Sciences of Philadelphia, Type no. H 1340.]

Size equal to about the average of *R. scutata,* but form apparently heavier, which is chiefly due to the broader pronotum.

Head with its greatest breadth equal to two-thirds of that of the pronotum (as 64 to 95),[9] its trigonal outline more strongly equilateral than in *scutata,* the greatest median depth equal to nine-tenths the head breadth (as 57 to 64), dorsal outline of occiput as seen in cephalic aspect moderately arcuate, slightly straighter laterad than medio-dorsad; ocelli and juxta-ocular nodose protuberances laterad of antennal bases as in *scutata;* facial scutellum with median depth contained 1.14 times in the greatest (ventral) breadth (as 22 to 25), ventral margin straight, lateral ones nearly straight and weakly converging dorsad, the greatest breadth at dorso-lateral angles equal to seven-eighths that ventrad, dorsal margin narrowly transverse truncate mesad with more lateral sections oblique truncate to dorso-lateral angles, the median truncate section slightly recurved cephalad, surface of scutellum smooth except for a pair of impressed points mesad (also found in *scutata*); eyes

[7] From θωρηκτής, armed with a cuirass, in allusion to the heavy pronotum.

[8] Received in exchange from the British Museum of Natural History, determined as *scutata* by Kirby.

[9] In the Palavange female of *scutata* here reported, these respective dimensions are as 59 to 70, or a head width of virtually seventeen-twentieths of that of the pronotum.

broadly rounded as seen in cephalic and dorsal aspects, in lateral view their outline is broadly subpyriform narrowing ventrad. Antennae setaceous, not reaching as far caudad as the caudal margin of the pronotum.

Pronotum scutellate and broadly ovoid in outline, the greatest breadth equal to slightly more than three-fourths of the median length of the pronotum,[10] the point of greatest breadth mesad, the outline more markedly narrowing caudad than cephalad, that of the cephalic half as a whole much more arcuate with a moderate median subobtuse angulation, which dorso-cephalic section is slightly marked off from the more lateral curvature and the border of which is unarmed, while thence to near the caudal margin the remainder of the lateral margins are regularly denticulate, the portion of the lateral margins caudad of broadest point of pronotum evenly and rather directly convergent to the relatively narrow arcuato-truncate caudal margin, which with the cephalic section of the cephalic one is appreciably cingulate; in transverse section the pronotum is decidedly tectate, even more complete and regularly so than in *scutata;* prozona but slightly longer than one-third of the entire pronotum (as 40 to 115) and medio-longitudinally with a distinct sulcus narrowly cephalad, this bordered laterad by paired cariniform series of papillae, most of the surface of the collar laterad of these with numerous nodose papillae, shaft with a pronounced thick but transversely smooth and rounded medio-longitudinal carina, laterad of which the surface of the shaft has a number of scattered nodose papillae; transverse sulcus brace-shaped and well impressed, not distinctly continued cephalad nor outlining the side of the collar, lateral flange surfaces thickly impressed cribosopunctulate caudad, this condition becoming obsolete cephalad and there replaced by scattered shagreen-like depressed denticles; ventral surface of flanges with margin strongly yet deplanately cingulate.

Tegmina with their length equal to approximately 2.2 times that of pronotum, their greatest width also contained 2.2 in their length, their apices surpassing the apex of the abdomen by about half the pronotal length; costal margin strongly arcuate in proximal fourth, nearly straight mesad and in distal fourth well arcuate to the obtuse-angulate apex, sutural margin moderately arcuate proximad and distad, nearly straight mesad, border finely denticulate over much of proximal two-thirds; marginal field with its greatest breadth at proximal fifth, this being equal to slightly more than one-fourth of total tegminal breadth (as 5.5 mm. to 19), thence distad regularly narrowing, many transverse nervures present with the intervening narrow areas having numerous anastomosing cross-veinlets, while the texture is subcoriaceous, anal field attenuately subpyriform, apex reaching to two-fifths of tegminal length, greatest breadth of anal field slightly less than that of marginal field, stigma well marked and subelliptical, longitudinal in disposition, discoidal field with sectors regularly spaced and definitely oblique in trend. Wings in repose reaching distad as far as the tegminal apices, general contour of apical margin agreeing with that of the same area of the

[10] In the same sex of *R. scutata* these proportions range from .66 to .69, while in the type of *thorectes* the ratio is .77 +.

tegmina, in texture this area is filled with a multitude of cross-veinlets producing a finely but irregularly areolate pattern, a condition found in the same area of the tegmina.

Abdomen with its apex failing to reach those of the tegmina by a distance approximately equal to one-third that of the pronotum, broadly fusiform in outline, its greatest breadth nearly equal to three-fourths of the evident ventral abdominal length; supra-anal plate narrow, strongly transverse, distal margin very weakly arcuate; cerci with their articles individually more elongate than in *scutata*, their apices briefly surpassing that of the abdomen.

Cephalic coxae with length equal to five-sixths that of pronotum (as 100 to 120), robust, in profile moderately arcuate, in cross-section compressed triquetrous, extensor surface subtectate and with numerous denticulate nodes which are depressed on distal portion of surface and roughly arranged in transverse series, external margin denticulate, flexor-external surface definitely concave transversely, flexor margin spined with a biseriate armament of which the larger category number 6–7, the two lengths often alternating, internal surface with a number of aciculate nodulosities toward the flexor margin; cephalic femora subequal to the pronotum in length, compressed, in lateral aspect elongate acute elliptical, the greatest depth, which is slightly proximad of middle, equal to slightly more than one-fourth of the femoral length (as 34 to 123), dorsal margin in general low arcuate but slightly flattened at broadest point, dorsal section of femur is seen to be sublamellate as viewed from dorsum, ventro-external (flexor-external) margin of femur with four stout spines, the two proximal ones more closely placed to one another than the others, plus a very slight spiniform node on the external genicular lobe, discoidal spines four in number, the third from the base twice as long as the fourth, the first and second shorter, the first the smallest, ventro-internal (flexor-internal) margin with 15 closely placed spines, biseriately arranged and alternating in length except that the distal four are disposed (reading distad) IIII, internal genicular lobe with a slight spiniform node similar to that on the external; cephalic tibiae and tarsi missing in the type. Median femora equal in length to five-sixths that of the pronotum (as 100 to 120), rather stout for the subfamily, somewhat tapering distad; median tibiae four-fifths as long as the femora (as 80 to 100). Caudal femora subequal in length to the pronotum and equal to 1.1 times that of median femora, somewhat tapering distad as in the median ones; caudal tibiae equal to eleven-twelfths of the caudal femoral length; caudal tarsi equal to seven-tenths the length of the caudal tibiae, the metatarsus not quite equal to one-half of the total tarsal length (as 36 to 76).

Coloration.—The type has been dried from alcoholic preservation, and is completely decolored except for the pale opaque stigma, which may or may not have had the present whitish color in life.

Measurements.—Length of body, 57.5 mm.; length of pronotum, 19.5; greatest width of pronotum, 15.1; length of tegmen, 42.5; greatest width of tegmen, 19; length of cephalic femur, 19; length of caudal femur, 18.

The type of this most striking species is unique.

RIVETININAE

OMOMANTIS Saussure

Omomantis sigma [11] new species (Plate III, figs. 2 and 3.)

This western Congo form of a genus previously known only from South and East Africa, differs from the male sex of *O. zebrata* (Charpentier) [12] in the more elongate limbs, the much more decidedly sigmoid character of virtually all of the discoidal sectors of the tegmina, in the less extensive but equally marked stigma of the same, the more strongly fuscous barred pattern of the tegmina, the more strongly transverse facial scutellum, the dorsal margin of which is definitely transverse truncate and without a median conical protuberance seen in all the five available males of *zebrata*. The caudal tarsi in *sigma* also have the metatarsus exceeding the combined length of the other articles, instead of subequal as in *zebrata*. Apparently no close relationship exists with *O. tigrina* Giglio-Tos, the third species of the genus, which is East African.

Type.—♂; Lukolela, Lake Leopold II District, Belgian Congo. (James P. Chapin.) [American Museum of Natural History.]

Size medium; form much as in *O. zebrata*.

Head in cephalic aspect transverse-trigonal in outline, greatest median depth contained 1.5 times in the greatest breadth across eyes, in cephalic aspect the eyes and portions of head laterad of occipital sulci are seen to be directed latero-cephalad; occipital line between the rather deeply impressed paired occipital sulci, as seen in cephalic aspect, almost imperceptibly convex, the sulci continuing to the latero-caudal borders of the occiput, outline of the occipital dorsum laterad of the sulci, as seen in the same view, slightly ascending laterad to the eye margins; ocelli large, prominent, placed in a depressed inverted triangle; facial scutellum transversely hexagonal, its greatest depth (mesad) being equal to but half the greatest width (across dorso-lateral angles), ventral margin equal to three-fourths of greatest width of scutellum and faintly concave, lateral margins straight, diverging dorso-laterad, dorsal margin made up of three sections, the lateral ones ascending and shallowly concave, the median straight transverse and equal to one-fourth of greatest width of scutellum, surface of scutellum subconcave and lacking any median conical protuberance. Eyes globose, moderately protuberant, very broad ovate in latero-cephalic aspect. Antennae setaceous,

[11] In allusion to the pronouncedly sigmoid character of the tegminal discoidal sectors.

[12] Compared with five males of this latter species from several localities in Natal and the Transvaal. See Ann. Transv. Mus., XII, p. 40, (1927).

when extended caudad reaching slightly caudad of the caudal margin of the pronotum.

Pronotum attenuate, in length subequal to half the tegminal length, shaft with its lateral margins appreciably concave, least breadth there (at middle of shaft) slightly less than half of the greatest breadth across collar (as 12 to 26), the latter contained 4.1 times in the greatest pronotal length; cephalic extremity of pronotum rather narrowly rounded, the lateral margins converging with a slight sigmoid flexure from the point of greatest width, where the lateral margins are rather sharply rounded, those of shaft described above, caudal extremity rounded with a slight flattening mesad, all margins except immediately at cephalic extremity and at the caudal one cingulately sublamellate, immediate margins minutely crenulate laterad on collar, virtually entire elsewhere; transverse dividing sulcus deeply impressed except immediately mesad; median line marked caudad to cephalic third of shaft by a sulcus, which cephalad becomes obsolete before reaching that extremity of the pronotum and caudad is subobsolete mesad and caudad on the shaft, which latter in transverse section is rounded dorsad.

Tegmina surpassing the apex of the abdomen by a distance hardly more than the transverse breadth of the head, elongate lanceolate in outline, the greatest breadth, which is at proximal fourth, contained nearly 4.2 times in the tegminal length; costal margin moderately arcuate in proximal third, thence straight to distal fourth and finally arcuately rounding to the narrowly rounded apex, sutural margin almost straight to distal third, thence quite low arcuate to the apex; marginal field reaching almost to the apex of the tegmen, its greatest breadth—which is at widest point of tegmen—but slightly less than one-fourth of the latter; anal field relatively narrow, reaching distad one-third the length of tegmen; majority of discoidal sectors very strongly sigmoid (see figure 2), much more so than in *O. zebrata,* stigma quite marked, in general outline subcircular, but in length no greater than the greatest breadth of the marginal field. Wings narrowly surpassing the apices of the tegmina, outline of apex of anterior field, as well as the distal curvature of the costal margin, as in the tegmina.

Abdomen relatively slender; supra-anal plate strongly transverse, low trigonal, its margin mesad very shallowly and weakly subangulately emarginate, and laterad subsinuate; cerci simple, briefly surpassing apex of subgenital plate, articles moniliformly marked, apices acute; subgenital plate moderately scoop-like, lateral margins arcuate as seen from venter, appreciably converging distad from a premedian broadest point to the stylar bases, distal extremity of plate transverse truncate, interspace between styles nearly equal to one-third the greatest breadth of the plate; styles simple, conical, definitely shorter than the interstylar space, apices acute.

Limbs as a whole elongate and slender, definitely more so than in the same sex of *O. zebrata;* cephalic coxae equal to eleven-thirteenths of the length of the cephalic femora, cephalic (i.e. dorsal) margin with 4 to 5 well-spaced recurved teeth, carination of external margin well indicated, unarmed; cephalic femora quite slender, the greatest depth contained almost

7.5 times in the femoral length, as seen in profile the whole is faintly arcuate, with the concavity dorsad, hence the dorsal line is faintly, the ventral more definitely, arcuate, ventro-external margin with four marked teeth, ventro-internal margin with 17 clearly placed spines of alternating length except that two of the shorter category are present distad between the terminal long one and the next one of the same length, discoidal spines three in number, the median much longer than the others, the cephalic the most recumbent; cephalic tibiae equal to little more than half the femoral length, straight, the apical claw relatively large, ventro-external margin with 10 to 11 distad progressively longer spines, a moderate unspined diastema present proximad, ventro-internal margin with 15 to 16 distad progressively longer spines, which series fills the margin; cephalic metatarsus in length exceeding that of the combined second to distal cephalic tarsal articles, the metatarsus appreciably flexed in proximal third, second article slightly surpassing the distal one in length. Median and caudal limbs slender; median femora subequal in length to the cephalic ones, median tibiae very slightly shorter than the femora; caudal femora longer than the median ones, their apices faintly surpassing the abdominal apex, caudal tibiae in length very slightly surpassing the femora, caudal tarsi with metatarsal length much exceeding that of the other tarsal articles combined (nearly 1.5 times as long), second article slightly longer than distal one.

Coloration.—Base color pale green (rivage green to clear yellow-green of Ridgway), areally on the head, pronotum and limbs embrowned to variable degrees with mahogany red to burnt lake, the discoidal and anal fields of the tegmina with a number of usually sigmoid barrings of madder brown to dahlia purple. Head with a dark transverse bar extending from eye to eye and involving the ocellar group, also extending caudad along the paired occipital sulci; eyes brussels brown; antennae pale in proximal portion becoming solidly fuscous thence distad. Pronotum with lateral rims clear green, the remainder washed with the mantling brownish, except for a pale narrow medio-longitudinal streak on the shaft and which is narrowly bordered laterad by relatively solid lines of mahogany red, becoming obsolete briefly before the caudal extremity, which has a pair of widely spaced brownish blotches. Tegmina with marginal field weakly washed with salmon pink adjacent to the costal margin, darker markings of the discoidal field of the tegmina strongly sigmoid and following the discoidal sectors, at least seven in number, plus a large proximal cloud of similar character, which bears the striking and large light green-yellow stigma, the latter bordered and embraced by a transversely disposed V-shaped marking of blackish purple, anal field with a relatively broad median suboblique marking of the same color as the maculae of the discoidal field. Wings clear with costal margin thalassine green and apex narrowly subopaque clear yellow-green. Cephalic coxae with teeth and their immediate basal areas mummy brown, cephalic femora with spines blackish tipped, except for a small brownish maculation near the ungual groove the internal face of these femora is unmarked, cephalic tibial spines blackish tipped, cephalic tarsi with articles black tipped,

internal face of metatarsus also lined to a greater or lesser degree with black. Median and caudal tarsi washed with pale brownish, the articles not definitely black tipped. Ventral thoracic surface clear greenish, abdomen similar but with a more yellowish tendency.

Measurements.—Length of body, 52 mm.; length of pronotum, 17.2; greatest breadth of pronotum, 4.2; length of tegmen, 34.5; greatest breadth of tegmen, 8.3; length of cephalic femur, 14.8; length of cephalic tibia (including apical claw), 8.1; length of caudal femur, 16.8; length of caudal tibia, 17.9.

The type of this very striking species is unique.

Hymenopodinae

CHLOROHARPAX Werner

Chloroharpax modesta (Gerstaecker) (Plate VI, fig. 16.)

1883. *Gonyp[eta] modesta* Gerstaecker, Mitth. Naturw. Ver. Neu-Vorpomm. und Rügen, Greifswald, XIV, p. 82. [♂; probably Cameroons.]

Cameroon: Bitje, Ja River; April to June, 1909; (Bates); one female; [A.N.S.P.]. Ebolowa; May 24, 1932; (H. C. Wing); one female; [A.N.S.P.]. "Cameroons"; August 30, 1928; one female; [A.M.N.H.].

In addition to the above females I have before me another of the same sex from Lagos, Nigeria, taken November 15–25, 1928, by C. B. Philip, belonging to the Academy collection.

The synonymy of this species has been given by Giglio-Tos in his monograph.[13] In the same work he places the genus in the Group Panurgicae of the Hymenopodinae, with *Panurgica* and *Propanurgica,* on account of the non-mammillate eyes. Even a casual comparison of *Chloroharpax* with *Panurgica* and *Pseudoharpax* will show that this reference completely ignores many features attesting the much closer relationship of *Chloroharpax* with *Pseudoharpax*. The stress placed by Giglio-Tos on the form of the eyes disregards other evident natural affinities, exhibited by similarities of the pronotal structure, tegminal development and details of the head other than the shape of the eyes. It is clearly necessary to move *Chloroharpax* into the Group Hymenopoda and discard acute eyes as one of the characters of that entity. Its position would be near the similarly Ethiopian *Pseudoharpax*.

The brownish infuscation of the pronotal dorsum is evident in all four specimens examined, occupying as it does a caudad-expanding area, of considerable width only on the metazona, almost

[13] Das Tierreich, lief. 50, p. 551, (1927).

entirely limited to the same in the Bitje specimen, which is in general quite pale yellowish. In other individuals the narrow cephalic tongue of the maculation reaches virtually to the cephalic margin of the pronotum. The blackish fuscous ring at the tegminal stigma varies individually in size and emphasis and completeness on the sutural side. The stigma itself breaks the costal completeness of the annulus.

The species (and genus) apparently is quite widely distributed over the West African Forest Province. From Lagos it is now known to range eastward to Ukaika, near the old post of Beni [14] at the eastern (Semliki) edge of the Congo forest (Werner, 1913), and southward to the Ogowe in Gaboon (Werner, 1908).

PANURGICA Karsch

Panurgica langi [15] new species

(Plate III, fig. 4; plate IV, figs. 5 and 6.)

This striking new species is more nearly related to *P. feae* Griffini, of which Cameroons material is now before me (see plate VI, figures 19 and 20), than to any other known member of the genus. The pronotal form more nearly approaches that of *feae*, but the greatest length and width are subequal and the angle of the lateral expansions is distinctly rectangulate, succeeded caudad by a briefly concave section, which regularly rounds into the caudad sharply converging lateral margins. Seen from the dorsum those portions of the pronotal margins cephalad of the greatest expansion converge in a rectangulate fashion, instead of the more distinctly acute angulate form seen in *feae*. Viewed in profile all the dorsal protuberances of the pronotum are higher, more pronounced and inflated in *langi* than in *feae*, the middle of the three very definitely divided longitudinally by a median sulciform impression into two mammiform lobules. The frontal process is slightly blunter than in *feae*, but the sculpture of the facial scutellum is essentially the same.

Type.—♂; Medje, Kibali-Ituri District, Belgian Congo. April to June, 1910. (Congo Expedition; Lang and Chapin.) [Ameri-

[14] For notes on the position of Ukaika see Rehn, Proc. Acad. Nat. Sci. Phila., LXXXIX, p. 76, (1937).

[15] In honor of my friend, Mr. Herbert Lang, to whose energy so much of the value of the collections of the American Museum Congo Expedition is due.

can Museum of Natural History.]

General size essentially as in *P. feae,* but tegmina somewhat longer; form in general as in *feae* except for details given herewith.

Head in outline, as seen in cephalic aspect, transverse trigonal, its greatest breadth contained nearly 1.2 times in the depth (as 27 to 32), the greatest breadth across eyes very slightly greater than the greatest breadth of the pronotum (as 32 to 30); as seen in dorso-cephalic aspect the juxta-ocular lobes are rather narrowly rounded-rectangulate, moderately caudad in general trend, remainder of the occipital outline quite deeply obtuse-angulate emarginate at the paired longitudinal occipital sulcations, which are continued as broader and more concave impressions ventro-cephalad to the lateral margins of the facial scutellum, while the median section of the occiput is convexly subbullate; ocelli placed in a triangle, large, the lateral ones of greater size than the median, set obliquely and elliptical in outline, while the median is circular; supra-ocellar frontal process of the occiput well developed, subdepressed and directed dorso-cephalad as seen in profile, as viewed from the dorsum its apex is bluntly rectangulate with the converging lateral borders moderately convex; facial scutellum essentially as in *P. feae,* its greatest breadth (across dorso-lateral angles) 2.4 times its median depth (as 36 to 15), surface mesad markedly concave-excavate, this bordered laterad by ventrad-converging intra-marginal sublamellate ridges, which are highest briefly dorsad of the ventral margin of the scutellum, dorsal margin of latter laterad concavely ascending to a pair of acute cephalad-projecting processes, which are subdeplanate, and separated by the strongly concave median section of the dorsal scutellar margin; clypeus with a low mediodorsal subacute process; eyes prominent, moderately directed latero-cephalad and broadly rounded as usual in the genus, slightly more strongly arcuate cephalad, also as usual in the genus when viewed in cephalic aspect their vertical axes converge toward the buccal region. Antennae about three times as long as the pronotum, articles distad of the second brevi-moniliform, each article narrowing toward the base.

Pronotum with greatest breadth, which is at two-fifths of the length, subequal to its median length, cephalic section of outline, as seen from dorsum, rather broadly arcuate mesad, this passing laterad into obliquely diverging sections which are but faintly concave and with a few low blunt dentiform nodes, apices of the lateral expansions narrowly rectangulate, followed caudad by a short subconcavity, and this in turn by much longer converging subarcuate sections, which reach and vertically ascend to the strongly arcuate elevated caudal margin, which latter has a pronounced intra-marginal sulciform concavity relieving the cingulate margin itself, breadth of the pronotum at the caudal constriction, which is at the juncture of the deplanate lateral sections and the elevated caudal one, somewhat less than half the greatest pronotal breadth (as 43 to 97); lateral sections or flanges cephalad of the caudal constriction moderately deplanate; length of collar and shaft subequal, median section of pronotum with the characteristic protuberances

of *Panurgica* relatively high and pronounced, that of the collar sublongitudinal in disposition, subcompressed cephalad, very faintly binodose caudad, and in longitudinal outline, as seen in profile, with three deplanations of its general arcuation, transverse sulcus deeply impressed, virtually bisecting the pronotum mesad, median elevation of shaft division of pronotum with a pair of closely and transversely placed bullate nodosities, separated by a depression over which passes a distinct medio-longitudinal carina, which is indicated only on the shaft, replaced caudad only on the collar by a shallow sulcation, the paired shaft nodosities are also separated from the caudal section of the same area by a sharply impressed transverse depression, which carried ventro-laterad becomes an intra-marginal sulcation relieving the ascending cingulate sections of the lateral margins, not merging, however, with the sulcation bordering the medio-caudal margin of the pronotum.

Tegmina translucent, somewhat less so along the costal section, in length surpassing apex of abdomen by a distance equal to approximately twice that of the pronotum, in general form much as in other species of the genus, greatest breadth, which is at distal fifth, contained 3.5 times in tegminal length, stigma not clearly marked; costal margin very shallowly arcuate in proximal half, straight thence to distal fifth, where it sharply rounds to the narrowly arcuate apex, sutural margin largely straight, distad more broadly and less strongly arcuate to the apex than is the case with the costal margin; marginal field in greatest width but faintly more than one-seventh of the whole tegmen, anal field elongate and acute pyriform, its apex reaching distad almost to basal two-fifths of length, discoidal field with its sectors more regular proximad and more indirect and angularly meandering distad. Wings reaching distad as far as the tegminal apices, their tips rounded subrectangulate, costal margin virtually straight except in distal fifth, where the curvature to the apex reproduces that of the same area of the tegmina; membranous except for a slight denseness of the distal section.

Abdomen depressed subfusiform in general outline, the broadest point at distal three-fifths and subequal to half the abdominal length, in distal half the disto-lateral angles of the tergites are distinctly angulate produced; supra-anal plate with distal margin arcuate; cerci relatively stout, subfusiform, hardly at all depressed, apices moderately acute and briefly surpassing apex of subgenital plate, articles very short, evident ones numbering twelve; subgenital plate rather broadly cochleariform, its proximal breadth eight-elevenths of its median length, lateral portions of margin briefly straight and subparallel proximad, thence arcuate to the stylar bases, the area between which, equal to approximately one-sixth of the proximal breadth, being shallowly concave, styles short, simple, tapering, blunt acute distad. Median section of distal margin of all abdominal sternites ranging from broadly obtuse-angulate produced (on proximal and distal ones) to arcuately lobate produced with a median acute process (third from distal), all with an evident medio-longitudinal carina, which is lamellately developed on those with the most decided distal marginal production, disto-lateral angles of the more distal abdominal sternites broadly rounded.

Cephalic coxae in length equal to very slightly more than three-fourths of the pronotal length (as 33 to 47), relatively stout, faintly arcuate as seen in profile, compressed triquetrous in cross-section, ventral and external flexor margins denticulate, on the latter biseriate in length, all denticules appreciably directed distad, latero-flexor face subconcave; cephalic femora equal in length to the greatest breadth of tegmen, moderately compressed, definitely trigonal in outline as seen in profile, greatest depth, which is slightly proximad of middle, contained nearly 2.75 times in the femoral length (as 52 to 142), dorsal line of femur nearly straight, this area forming a sublamellate section the actual margin of which is nodoloso-denticulate, external face dorsad subconcave longitudinally, ventro-external margin, laterad of spines, very shallowly cingulate, with a few nodulosities distad, ventro-external spine series numbering four, the median two the longer and subequal in length, plus a much smaller point on the external genicular lobe, discoidal spines four in number, with the third from the base over twice as long as any of the others and the proximal one quite small, all, and particularly the distal one, directed distad, ventro-internal margin with 12 spines of biseriate and regularly alternating length, the distal of the longer and the proximal of the shorter category; cephalic tibiae without apical claw, equal to two-thirds the length of the cephalic femora (as 95 to 142), trigonal in section, slightly arcuate in profile, ventral surface distinctly concave, ventro-external margin with 12 rather thick spines, which are short, deplanate and serrate in disposition proximad, regularly increasing in length and prominence distad, all directed very definitely distad, ventro-internal margin with 11 well-developed spines which are less serrate and more separate than the external ones, regularly increasing in length and arcuation distad, apical claw arcuate and well developed, equal to one-fourth the length of the tibia minus the claw; cephalic metatarsi slightly longer than remainder of tarsi, the whole tarsus faintly longer than cephalic tibia without apical claw (as 100 to 95). Median femora equal to approximately seventeen-twentieths of the length of the cephalic femora (as 122 to 142), moderately slender, subcircular in section except for a low dorso-cephalic carinula and a ventro-external lamellate flange, which preapically is developed into an obtuse-angulate lobe; median tibiae approximately four-fifths as long as the femora (as 96 to 122), very weakly inflated on extensor surface in proximal two-thirds, that surface more concave and the whole tibia more slender in distal third. Caudal femora 1.3 times the length of the pronotum, in general form, development and lobation similar to the median femora except that they are more slender, the dorsum is more rounded transversely and the dorso-external carina is more evident proximad but obsolete distad; caudal tibiae equal to slightly more than four-fifths the length of the caudal femora (as 115 to 140), proportionately much more slender than median pair, faintly thickened dorsad slightly distad of middle, distal portion in general form resembling that of median ones; caudal tarsi slightly shorter than caudal tibiae (as 90 to 95), metatarsus equal to approximately two-fifths of the whole tarsus (as 35 to 90), it and the two succeeding articles somewhat thickened at their distal extremities.

Coloration.—General base color of body ranging from apricot buff to onion-skin pink (of Ridgway), the whole solidly overlaid with fine stipplings or maculations of mars brown to mummy brown; tegmina and wings very weakly tinted with ochraceous-buff, this more solid along the costal sections of both the tegmina and wings and more broadly at their apices, the veins finely pencilled with the same, the principal ones near the apices or where they reach the margin of the radiate field of the wings briefly pencilled or smudged with prout's brown, briefly pre-mesad the tegmina have two groups of transversely disposed small infuscations of the same placed on the veins. Head predominatingly dark, eyes solidly fuscous, antennae cinnamon-brown, darker at immediate base. Pronotum with the contrasting of the two general tones pronounced, the more elevated points usually paler, but most pale areas are finely stippled with darker. Limbs heavily overmarked with the darker tone, the cephalic tibiae and tarsi and all the median and caudal limbs (less evident on tarsi) alternately annulate with dark and light, external face of cephalic coxae and femora heavily stippled with dark on light, internal surface of both cephalic coxae and femora solidly dark fuscous, except that pale areas are marked at the bases of the shorter spines of the ventro-internal series of the femora; all spines dark tipped.

Measurements.—Length of body, 27 mm.; length of pronotum, 5; greatest width of pronotum, 4.9; length of tegmen, 29.5; greatest width of tegmen, 8.4; length of cephalic femur, 8.4; length of caudal femur, 6.5.

The type of this striking species is unique.

Panurgica mende [16] new species (Plate VI, figs. 17 and 18.)

More nearly related to *P. fratercula* Rehn [17] than any other form of the genus, the comparison here made being drawn from a paratypic male of that species. The new form differs in the male sex from that of *fratercula* in the less pronounced but still markedly evident paired triangular productions on the dorsal margin of the facial scutellum, in the proportionately longer metazona of the pronotum, which gives less emphasis to the lateral expansions, the latter being more rounded, and also in the more rounded and less triangular distal lobe on the caudal femora. I do not know the female sex.

Type.—♂; Pujehan,[18] Sierra Leone. [Academy of Natural Sciences of Philadelphia, Type no. H 1339.]

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[16] A Sierra Leone people of the Pujehan area.

[17] Proc. U. S. Nat. Mus., XLII, p. 468, figs. 10 and 11, (1912). [♂; Mt. Coffee, Liberia.]

[18] Pujehun on some charts. Its position is approximately 7° 25′ N., 12° 40′ W., on the Wanje River. Elevation 60 feet.

General size and form much as in *P. fratercula.*

Head in outline, as seen in cephalic aspect, transverse trigonal, its greatest depth contained slightly less than 1.5 times in the greatest breadth across eyes (as 63 to 91), the latter equal to nine-tenths of the greatest pronotal breadth (as 91 to 101); as seen in dorso-cephalic aspect the juxta-ocular lobes are low and broadly rounded both transversely and longitudinally, the occipital outline hardly at all emarginate at the paired longitudinal occipital sulcations, which broadly and rather shallowly continue as concave impressions to the antennal bases, median section of the occipital outline transversely subtruncate, median section of the occiput cephalad of the transverse border rather low arcuate bullate transversely, terminating cephalad in the short but acute frontal process, which is deplanate ventrad and in general direction extends very faintly dorso-cephalad, while as seen from dorsum its lateral margins are subconcave; ocelli as described for *P. langi;* facial scutellum much as in *P. fratercula* but very slightly deeper mesad, the depth there being nine-twentieths of the greatest dorsal breadth (as 13 to 28),[19] while the paired triangles of its dorsal margin are blunter and more obtuse as seen from the dorsum, surface of scutellum with the lateral subarcuate intra-marginal carinae obsolete dorsad; clypeus with medio-dorsal protuberance very low and obtuse; eyes prominent, moderately directed latero-cephalad and broadly rounded as usual in *Panurgica,* also as viewed in cephalic aspect their vertical axes converge ventrad toward the buccal region. Antennae incomplete, remaining portions as here described for *P. langi.*

Pronotum with greatest breadth, which is at nine-twentieths of the length, equal to two-thirds of the latter (as 68 to 101), cephalic portion of outline, as seen from dorsum, laterad obliquely straight convergent cephalad to the rather narrowly rounded cephalic extremity, the lateral sections sparsely and finely serrulate a short distance cephalad of broadest point of pronotum, lateral margins rounded over broadest point of pronotum with a very faint intimation of an obtuse-angulation, thence caudad to narrowest section of pronotum, which is at caudal fifth and equal transversely to ten-seventeenths of the greatest breadth (as 40 to 68), the lateral margins are moderately and regularly arcuate convergent, following which the caudal extremity of the pronotum is elevated and marginally semicircularly arcuate, intra-marginal concavity as in *P. langi,* and general development of the marginal flanges as in that species, but the same are narrower laterad; length of collar definitely less than that of shaft, being not more than nine-twentieths of the total pronotal length (as 45 to 101), median section of pronotum with its profile as in *P. fratercula,*[20] the low rounded surface bosses also as in that species, the compression of the cephalic section of the collar also being of the same character and degree as in *fratercula.*

Tegmina with the costal section and apex less translucent than the remainder, in length surpassing the abdominal apex by a distance equal to four-fifths of the pronotal length, in general form as in *fratercula,* greatest

[19] In the paratype of *fratercula* this ratio is two-fifths (as 12 to 29).
[20] Proc. U. S. Nat. Mus., XLII, p. 469, fig. 11, (1912).

breadth, which is at distal fifth, contained 4.25 times in tegminal length, stigma poorly indicated; costal margin as in *P. langi* but less broadly and more obliquely arcuate distad, apex narrowly rounded acute, sutural margin in greater part straight, in distal fifth obliquely low arcuate to apex in the same degree as the costal margin; marginal field with its greatest breadth, which is at proximal fifth of tegmen, equal to approximately one-sixth of the tegminal breadth at the same point, anal field elongate, narrow, very acute distad, its apex reaching distad to three-sevenths of the tegminal length from the base, discoidal field with the sectors regularly placed and evenly arcuate, disposed as in *P. fratercula,* and lacking the angulate meandering seen in *P. langi* and to a lesser degree in *P. feae.* Wings when closed reaching as far distad as the apices of the tegmina, their apical section in outline rounded subacute-angulate, somewhat broader than the tegminal apices.

Abdomen proportionately narrower than in *P. langi* or *feae,* agreeing with that of *fratercula,* more evenly subfusiform in outline, the broadest point at middle of abdominal length and equal to three-sevenths of the ventral length of the abdomen, none of the tergites angularly produced disto-laterad; median section of antepenultimate and preceding sternites with distal margin obtuse-angulately lobate produced, with the apices of the same transversely truncate, penultimate sternite and that preceding the two with strongly produced margins very faintly low arcuate produced mesad, the more proximal one with its apex faintly concave-emarginate, ultimate sternite with its distal margin broadly but very faintly concave, none of the sternites bearing any trace of median vertical lamellations and disto-lateral angles of all well rounded; supra-anal plate short, strongly transverse and very broadly obtuse-angulate distad with immediate apex narrowly subemarginate; cerci relatively stout, subequal in breadth in proximal three-fourths, tapering distad, apices acute, in section circular and not depressed, in length surpassing the subgenital plate by a distance equal to a greater part of the length of the latter, articles very short, fusing proximad so number cannot clearly be ascertained; subgenital plate broad cochleariform, its median length equal to two-thirds of its proximal breadth, lateral portions of margin briefly straight and subparallel proximad then obliquely arcuate convergent to the stylar bases, between which the margin is transverse truncate, styles very short, simple, tapering, blunt acute distad.

Cephalic coxae with their length contained 1.2 times in that of the pronotum (as 33 to 40), distinctly more slender than in *P. langi* and slightly more so than in *fratercula,* very faintly arcuate and chiefly so in extensor outline, subcompressed triquetrous in cross-section, ventral (flexor) margin with eight or so denticulations which are widely spaced except for a distal group, ventro-external margin with a much more numerous and regular series of serrately disposed denticulations; cephalic femora equal in length to 1.3 times that of the pronotum, compressed to the same degree as in *fratercula* but somewhat less so than in *langi,* in lateral view trigonal in outline, the greatest depth, which is at proximal two-fifths, contained three

times in the femoral length (as 47 to 140), dorsal margin of femur slightly arcuate, the immediate margin finely serrulato-denticulate, more sparsely so proximad, the dorsal section of the femur less lamellate subcompressed than in *P. langi,* ventro-external spine series numbering four, of subequal length, plus a much smaller one on the external genicular lobe, the four being as stout but somewhat shorter that those of *langi,* margin between the spines serrulato-denticulate, discoidal spines four in number with the third from the base nearly three times as long as any of the others, the proximal one very small and all except the latter directed strongly distad, ventro-internal margin with 12 spines of biseriate and regularly alternating length, the longer ones averaging about twice the length of the shorter, the distal of the longer and the proximal of the shorter category, internal genicular lobe with a very short spinule; cephalic tibiae without apical claw equal to approximately three-fifths the length of the cephalic femora (as 80 to 137), trigonal in section, very faintly arcuate in profile, ventral (flexor) surface subconcave, ventro-external margin with 13–14 short, deplanate and serrately disposed spines, increasing in length and prominence distad, ventro-internal margin with 13 well-developed and more individually separated spines, regularly increasing in length and arcuation distad, apical claw arcuate and very elongate, slightly more attenuate than in *P. langi,* equal in length to half of tibia minus claw (as 40 to 80); cephalic metatarsus equal to more than 1.3 times the length of the remainder of the tarsus (as 55 to 40), the whole of the latter appreciably longer than the cephalic tibia with claw (as 95 to 80). Median femora equal to seventeen-twentieths of the length of the cephalic femora (as 126 to 137), in general similar to, but slightly more slender than, the median femora of *P. langi,* with little evidence of a dorso-cephalic carinula, the ventro-external lamellate flange lower and less strongly developed and with its preapical lobe lower and definitely arcuate in outline;[21] median tibiae equal to seven-tenths the length of the median femora (as 87 to 126), but faintly thickened in proximal two-thirds, the concavity of distal third, as found in *langi,* but weakly indicated. Caudal femora 1.3 times the length of the pronotum, in general development except for their greater length and slenderness essentially as the median femora, while the dorso-external carina is indicated proximad but obsolete distad and the preapical lobe is slightly deeper; caudal tibiae but slightly shorter than the caudal femora (as 130 to 137), more slender than median ones but general contour similar and without any median thickening as in *langi;* caudal tarsi distinctly shorter than caudal tibiae, being equal to but ten-thirteenths the length of the latter (as 100 to 130), metatarsus equal to exactly half the total tarsal length,[22] it and the two succeeding articles slightly thickened at the distal extremities as in *langi* but to a lesser degree.

[21] In *P. fratercula* this is but slightly higher than in *mende* but its outline is distinctly obtuse-angulate.

[22] In *P. fratercula* the caudal metatarsus is equal to slightly less than the length of the succeeding tarsal articles together (as 45 to 50).

Coloration.—General base color of body ranging from ochraceous-buff to pinkish-buff and cinnamon-buff, overlaid in much the greater part with maculations or cloudings of cinnamon-brown to mummy brown; tegmina and wings strongly washed with light grape green (of Ridgway), opaquely so along the tegminal humeral trunk, the apices of the tegmina and wings weakly clouded with prout's brown. Head longitudinally quinque-maculate with darker, facial scutellum touched with same dorsad; eyes very dark; antennae pale proximad, darker elsewhere (as far as preserved). Pronotum with lateral borders for short distance caudad of broadest point infuscate, the same pale cephalad of that point, median elevations clouded laterad. Abdomen almost wholly cinnamon-brown. Limbs having each section except tarsi appreciably trifasciate or triannulate with dark on light, these only on the external face of the cephalic femora and coxae, nearly or quite complete annuli for the other sections, internal face of the cephalic femora and coxae clear ochraceous-buff, the latter with distal sixth and the adjacent surface of trochanters solidly fuscous, proximal extremity of the cephalic femora narrowly clouded with fuscous, the dorsal border narrowly carrying the external dark bars on to the internal face; larger internal cephalic femoral spines dark at their bases, virtually all spines black tipped.

Measurements.—Length of body, 25.4 mm.; length of pronotum, 5.1; greatest width of pronotum, 3.4; length of tegmen, 22.5; greatest width of tegmen, 5.3; length of cephalic femur, 6.8; length of caudal femur, 6.4.

The type of *mende* is the only representative of the species which I have seen.

PSEUDOHARPAX Saussure

Pseudoharpax abyssinicus Beier

1930. *Pseudoharpax abyssinicus* Beier, Ann. and Mag. Nat. Hist., (10) VI, p. 457. [♂; Plains North of Lake Zwai, 5500–6000 feet, Abyssinia.]

ABYSSINIA: Addis Ababa; July 5–12, 1920; one female; [A.M.N.H.].

The adult male and immature females reported by me in 1901 as *P. virescens* (Serville), from Sheikh Husein, Gallaland,[23] I find are also referable to Beier's recently described *abyssinicus*. With specimens of both sexes before me, however, I find certain features worthy of note.

The ocular processes are appreciably directed latero-cephalad but are quite short, and can hardly be called "strong." The males have a broad medio-longitudinal bar on the pronotum solidly black, as noted by me in 1901, and an intimation of the same is seen in immature females, the adult female from Addis Ababa having been decolored by alcoholic preservation. The male length

[23] Proc. Acad. Nat. Sci. Phila., 1901, p. 287, (1901).

of body given by Beier must include the alar appendages, and this would coincide with a similar measurement of the Sheikh Husein male, all the other proportions of the latter fully agreeing with Beier's measurements. The true body length of the male before me is 17 mm. The Addis Ababa female shows the following dimensions: length of body, 19.2 mm.; length of pronotum, 4.89; greatest width of pronotum, 2.93; length of tegmen, 15.5; length of cephalic femur, 6; greatest depth of cephalic femur, 1.79.

The three localities given above are all from which the species is at present known.

PSEUDOCREOBOTRA Saussure

Pseudocreobotra ocellata (Beauvois)

1805. *Empusa ocellata* Beauvois, Ins. Rec. Afr. Amér., p. 110, Orth. pl. XIII, fig. 2. [♀; "Les déserts du royaume d'Oware" (present southern Nigeria, west of mouth of Niger River).]

FRENCH EQUATORIAL AFRICA; MIDDLE CONGO: Brazzaville; 1919; one female; [A.N.S.P.].

CAMEROONS: Bitje, Ja River; one labelled April, 1909, rainy season; (Bates); two males, two females; [A.N.S.P.]. Ebolowa; September 3, 1931; (H. C. Wing); one female; [A.N.S.P.].

BELGIAN CONGO: Lukolela, Lake Leopold II District; January 14, 1931, October 20, 1930; (James P. Chapin); two males; [A.M.N.H.]. Stanleyville; April 6, 17 and 28, 1915; (Lang and Chapin); one male, three females; [A.M.N.H.]. Medje, Kibali-Ituri District; April 23, July 30 and September 1–6, 1910; (Lang and Chapin); two males, three females; [A.M.N.H.]. Gamangui, Kibali-Ituri District; February 21, 1910; (Lang and Chapin); one male; [A.M.N.H.]. Niangara, Uele District; November 8–19, 1910; (Lang and Chapin); one male, eight females; [A.M.N.H.]. Faradje, Uele District; December 12, 1912, July 13, 1913; (Lang and Chapin); one male, two females; [A.M.N.H.].

UGANDA PROTECTORATE: Mabira Forest; September, 1920; (Dummer); one male, three females; one immature female; [A.N.S.P.].

KENYA COLONY: Kisumu, Kavirondo Gulf, shore of Lake Victoria; July 5 and 11, 1930; two females; [A.N.S.P.].

This considerable series is of exceptional interest. All of the specimens are typical *ocellata,* and in none is evident any distinct tendency toward *P. wahlbergii* of more eastern and southern Africa. The material from the savannah and gallery-forest areas about Niangara and Faradje is fully typical of this West African type.

In the present series we find a number of specimens showing the rose-pink or even brick-red wash on the tegmina, and sometimes the limbs as well, which I have already noted.[24] One Medje male has the ocelli on the tegmina, the proximal pale band, the marginal field of the tegmina, the limbs and most of the body distinctly washed with rose-pink. A female from Stanleyville is much the same although the wash is deeper in tone and less evident on the pronotum. A single Niangara female has no suffusion on head, pronotum and cephalic limbs, and a limited rose-pink wash on the median and caudal tibiae and distad on their respective femora, while the tegmina have the proximal pale bar ochraceous and the ocelliform spot vividly scarlet. One Faradje female is strongly washed with deep rose-pink, in fact rose-purple where heaviest, involving the same areas as in the Stanleyville female above mentioned. Another Faradje female has merely a faint tinge of rose-pink to the ocelliform pattern. One of the Mabira Forest females has a weak rose-pink wash in the more proximal portion of the pale section of the ocelliform tegminal pattern. One Kisumu female has the same marking as a whole weakly washed with rose-pink, and another is even more slightly and less completely tinted with the same shade. Every other specimen in this series shows virtually no touch of pink or red overwash and in this respect they contrast strikingly with the suffused individuals from the same localities.

Beauvois' *ocellata* is a typical West African species, replacing in its territory the members of the genus, i.e., *wahlbergii* and *amarae*, found in East, Northeast and South Africa. Its distribution is known to extend from Portuguese Guinea eastward to Uganda and the extreme western portion of Kenya Colony, encircling Lake Victoria, southward across the Cameroons, Gaboon, Middle Congo and most of the Belgian Congo to the Lower Congo and at least the south-central portion of that great colony. The eastern boundary of its distribution—in western Kenya—probably extends beyond the limits of the West African fauna. The exact extent of its distribution to the south and southeastward is not clearly known, as certain of the published records of *wahlbergii*

[24] Wiss. Ergebn. Deutschen Zent.-Afrika-Exped. 1907–1908, v, Zool. III, lief. 1, p. 25, (1914).

appear to me to be based on the present species. The relationship of the two has already been discussed by a number of authors.

Pseudocreobotra wahlbergii Stål

1871. *P*[*seudocreobotra*] *wahlbergii* Stål, Öfversigt K. Vetensk.-Akad. Forhandl., 1871, no. 3, p. 385. [♀; Caffraria.]

KENYA COLONY: Kibwezi, Ukamba District; 3000 feet; (Dummer); December 30, 1921; one female; [A.N.S.P.].

This specimen is quite large, in every dimension except tegminal length slightly exceeding the maximum for the female sex of the species given by Giglio-Tos.[25]

The interdigitation in Kenya of the ranges of *P. wahlbergii* and *ocellata* is not clearly understood, but apparently *wahlbergii* is more partial to arid and semi-arid conditions, and *ocellata* to localities with West African faunal infusions. While the Galla-land *amarae* Rehn is more nearly related to *wahlbergii* than it is to *ocellata,* it possesses distinctive head and pronotal characters, which, judging from the evidence of sixty-six adult individuals of the genus now before me, are fully characteristic.

VATINAE

STENOVATES Saussure

Stenovates spectrum new species (Plate VI, fig. 21.)

A very striking species, larger than the genotype *S. pantherina* Saussure,[26] but differing in addition in a number of features, the most noteworthy of which are, the equally elongate but more robust form, especially of the pronotum, the proportionately broader tegmina, less oblique truncate alar apices, in the cephalic tibiae having twenty to twenty-two instead of thirteen spines on the internal margin, in the median and caudal femora not being definitely attenuate in the middle, and in the absence of white areas from the wings.

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[25] Das Tierreich, leif. 50, p. 563, (1927).

[26] Mél. Orthopt., II, fasc. 4, p. 84, pl. 9, fig. 31, (1872); [♀; "Central America" (in error)]. The species has since been shown to be one of the Sudanese region of Africa, being recorded from localities extending from Portuguese Guinea (Rio Cassine) to the Blue Nile and British Somaliland, as well as Kuvangu, Angola. Kirby's *Pseudochaeta strachani* (Ann. and Mag. Nat. Hist., (7) XIII, p. 88, (1904); [♀; Lagos[, Nigeria]] is usually considered to be synonymous. When the new species here described is compared with the description of the latter it is at once seen they are quite different species.

The description of *pantherina* given by Giglio-Tos in his monograph [27] approaches this species much more nearly than it does the original description of that species or of Kirby's *strachani*. It is possible it was based chiefly on Portuguese Guinea material recorded by him in 1907, and which may belong to *S. spectrum*, here described.

Type.—♀; Monrovia, Liberia. December 11, 1920. (Otis W. Barrett.) [Academy of Natural Sciences of Philadelphia, Type no. H 1341.]

Size large (length of body, 127 mm.); form slender and elongate, alate-baculiform; surface relatively smooth.

Head with its greatest breadth nearly 1.6 times that of the broadest point of pronotum (as 58 to 37), in general outline as seen from dorsum transverse arcuate, with the cephalic surface as a whole very appreciably concave and the eyes directed latero-cephalad; in dorso-cephalic aspect the occipital line is evenly and moderately arcuate, as seen in direct cephalic view it appears straight, lateral sections of occiput as seen from dorsum curving latero-cephalad to eye bases, longitudinal occipital sulci finely marked, less evident dorsad than cephalad; ocelli placed in a low broad triangle, each elliptical in basal outline; facial scutellum low and strongly transverse, its greatest median depth contained approximately three times in the greatest (dorsal) breadth, dorsal margin interantennally arcuate produced dorsad, the lateral portions (infra-antennal in position) moderately concave, ventral margin as a whole very shallowly concave, nearly straight, lateral margins straight, obliquely diverging dorso-laterad; eyes submammillate as seen in all aspects but without terminal protuberances, their vertical axes strongly converging ventrad, as seen from dorsum the latero-cephalic trend of the eyes is very marked. Antennae setaceous, in length not quite equal to half the pronotal length.

Pronotum baculiform, with its greatest breadth, which is dorsad of the articulation of the cephalic limbs, equal to no more than one-eighth of the pronotal length, breadth at caudal extremity faintly less than that dorsad of limb insertion; cephalic extremity quite narrowly rounded, the outline of the collar section slightly narrowing regularly from the broadest point, where the lateral margins are moderately arcuate, lateral margins of shaft section of pronotum straight, the shaft but not its lateral margins faintly broadening caudad, and with the caudal extremity broadly rounded, immediate border of the lateral margins, except over the greatest expansion, with spaced denticulations; in section dorsad the collar is transversely arcuate, the shaft distinctly trigonal, in lateral view the dorsal outline of the former is somewhat lower than that of the shaft and rounds ventro-cephalad to the cephalic margin, the dorsal outline of the shaft nearly straight, arcuately ascending very narrowly at the caudal extremity; length of collar contained more than

[27] Das Tierreich, lief. 50, p. 617, (1927).

4.5 times in that of shaft (as 55 to 252), surface of collar with a shallow median sulcation which becomes obsolete cephalad, transverse sulcus but shallowly impressed mesad but deeply etched laterad where it is sharply curved cephalad about collar, shaft with a marked medio-longitudinal carina, which regularly increases in height caudad virtually to the caudal margin, where it is also flanked by paired caudad-converging inflated but relatively low bosses, each of which is concavely impressed mesad, general surface of collar with numerous small aciculate nodules, that of shaft also with similar but much more scattered raised points.

Tegmina subcoriaceous except narrowly along the sutural margin where it is translucent, in repose covering five-sevenths of the dorsal abdominal length to the base of the supra-anal plate, of lanceolate form and subequal width, with the greatest width, which is at the proximal fifth, contained nearly 4.5 times in their length, lateral margins roughly subparallel, costal margin well arcuate proximad of broadest point of tegmina, thence nearly straight to distal fifth, where it rounds to the rounded subacute apex, sutural margin in general almost straight except proximad and distad, more shortly and strongly arcuate to the apex than the costal one; marginal field with its greatest breadth equal to slightly less than one-fourth of the greatest breadth of the whole tegmen (as 17 to 75), regularly narrowing distad, its venation a coarse network of irregular but relatively large areolae, anal field proper very narrow and elongate, its very acute apex reaching slightly distad of the proximal two-fifths of the tegminal length, discoidal sectors moderately oblique, areolation of both discoidal and anal fields basically quadrate to rectangulate, more irregular, narrower and sigmoid or sinuate as the margins are approached. Wings in repose narrowly surpassing the tegminal apices (by 2.6 mm.), their greatest breadth when expanded contained 1.6 times in their length, costal margin straight except in distal fifth, where the arcuation to the apex is the same as that of the corresponding area of the tegmina, apex rounded rectangulate.

Abdomen baculiform, slightly broadened at the antepenultimate tergite, which is arcuate laterad as seen from dorsum, this general curvature, in the same view, peripherally outlining the penultimate and ultimate tergites laterad and distad, distal margins of the antepenultimate and penultimate tergites subtruncate mesad and shallowly concave laterad, of ultimate tergite broadly arcuate with a very slight median angulate lobulation, length of antepenultimate tergite not quite equal to one-third that of preceding tergite, penultimate very shallow and not more than one-fifth as long as the antepenultimate, ultimate with its median length equal to half that of antepenultimate, latter with a shallow median tectation; supra-anal plate acute trigonal, its median length subequal to half its greatest proximal breadth (as 16 to 30), with a pronounced medio-longitudinal tectate carination, which is largely bordered laterad by a pair of depressed areas which also outline mesad swelling arcuations of the surface which rise to the converging lateral portions of the margin; cerci depressed, as a whole remiform, their greatest breadth approximately one-seventh of their length, distal article with its lateral

margins well arcuate to the transversely truncate apex; subgenital plate moderately inflated laterad to the same degree as the tergal aspect, medio-ventral rostrate section moderately produced.

Cephalic limbs slender; cephalic coxae equal to slightly less than half the length of the pronotum (as 22 to 47), straight, triquetrous in cross-section, extensor surface having the vicinity of its tectation with a longitudinal irregularly disposed series of depressed points, ventro-external (latero-flexor) surface subdeplanate proximad, shallowly concave distad, flexor margin with 5–7 recurved teeth, chiefly grouped proximad and between which it is armed with numerous similarly recurved denticles, internal surface with a sparse and spaced series of sublongitudinally disposed very low nodes; cephalic femora slightly longer than coxae (as 26 to 22), straight proximad, in distal two-fifths somewhat curved dorsad, the dorsal margin in profile thus appreciably concave distad, the whole weakly compressed, external flexor margin with five prominent and well-spaced spines, the axes of which are directed faintly laterad when the femur is viewed from the dorsum, and of which the proximal one, which is somewhat shorter than the second but distinctly longer than the others, is separated from the others of the series by a pronounced surface depression, in which rests the distal spine of the external tibial series, between the second and fourth spines of this margin, the immediate margin, which is mesad of the large spines, is weakly denticulate, external genicular lobe with a spine of the same general type as those of the external flexor margin but smaller and distinctly directed distad, discoidal spines four in number, the third from base the longest, the fourth next in length and more inclined distad than the others, the second and first decreasing in length proximad, flexor surface proximad of discoidal spines with a medio-longtiudinal series of acute nodules, internal flexor margin with six spaced larger spines and intercalated shorter ones disposed as follows (reading distad) IIıIıIıIıIıIII(ı)I, internal genicular lobe with a spine which is much shorter than that on the external lobe; cephalic tibiae without apical claw subequal to half the length of the femur (as 13.7 to 26 mm.), quite slender, subtrigonal in cross-section but transversely arcuate on extensor surface, flexor external margin with seven moderately recurved spines, well spaced except that the much larger distal one and that preceding it are more closely placed than any of the others, flexor internal margin with a closely placed series of 21–22 distad regularly larger spines, those distad becoming distinctly falcate and of the same general contour as the very much larger apical claw; cephalic tarsi equal in length to five-eighths that of tibiae, very slender, the metatarsus composing approximately three-fifths of the total tarsal length. Median femora equal in length to three-fourths that of the cephalic femora, very faintly enlarging proximad, the distal extremity also weakly clavate and with its immediate dorsal outline slightly depressed, genicular lobes moderately produced, arcuato-truncate distad, dorsal surface of femora distinctly carinate longitudinally, also the entire ventro-cephalic angle; median tibiae subequal to the femora in length, slender, faintly enlarging in proximal half, in section pentagonal, the angles

all carinate. Caudal femora but faintly shorter than the cephalic femora (as 24.5 to 26 mm.), in structure essentially as the median ones, but longer and more slender and less appreciably enlarged proximad; caudal tibiae subequal to the femora in length, similar in general to the median tibiae but longer and definitely more slender and less evidently enlarged proximad; caudal tarsi equal to approximately five-twelfths of the tibial length, the metatarsus to two-fifths of the total tarsal length, its angles longitudinally carinate as on the tibiae.

Coloration.—General tone cinnamon-brown to prout's brown, paling to wood brown on the collar of the pronotum and most of the head, as well as on the flexor surfaces of the cephalic femora and tibiae and proximad on the cephalic coxae. Tegmina pale cinnamon-brown, subhyaline along sutural section and with many scattered aerolets of the same over the whole of the tegmina. Wings basally saccardo's umber (of Ridgway), with numerous transverse maculae and fine barrings of prout's brown, these largest in the middle of the wing (see plate VI, figure 21). Internal surface of cephalic coxae and femora more or less heavily infuscate with mummy brown, the median and caudal tibiae and distal sections of the corresponding femora similarly washed. Obscure markings on the head and cloudings laterad on the pronotal shaft and abdominal appendages of the same tone.

Measurements.—Length of body, 127 mm.; length of pronotum, 47; greatest breadth of pronotum at insertion of cephalic limbs, 6; greatest breadth of pronotum at caudal extremity, 5.7; length of tegmen, 54; greatest width of tegmen, 12.2; length of wing, 50; length of cephalic femur, 26; length of caudal femur, 24.5; length of cercus, 9.9.

The type is the only specimen I have seen of this most unusual species of a genus which is but infrequently encountered.

EMPUSINAE

EMPUSA Illiger

Empusa guttula (Thunberg)

1815. *G[ongylus] guttulus* Thunberg, Mém. Imp. Acad. Sci. St. Pétersb., v, p. 294. [Unknown locality.]

ANGOLA: Capelongo; July 25, 1925; one female; [A.M.N.H.].

The identity of Thunberg's very poorly described *guttula* with *fronticornis* as understood by Saussure is taken from Stål.[28] As assigned by Giglio-Tos[29] my 1912 record of *fronticornis* from South-west Africa[30] also refers to this species.

The species is widely distributed over most of Africa south of the Sahara, but owing to the confusion which has existed in the

[28] Bihang K. Svenska Vet.-Akad. Handl., IV, no. 10, p. 77, (1877).
[29] Das Tierreich, lief. 50, p. 636, (1927).
[30] Archiv. für Naturgesch., LXXVIII, abt. A, heft 6, p. 122, (1912).

names of African species of *Empusa,* the literature alone is of but limited value in mapping distributional information for this and other members of the genus.

HEMIEMPUSA Saussure and Zehntner

Hemiempusa phantasma new species (Plate IV, figs. 7 and 8.)

Closely related to the widely distributed *H. capensis* (Burmeister), with both sexes of which from South African localities the new form has been compared. It differs chiefly in features most evident in the female sex, these being the deeper and more pronounced apical cleft of the fastigial process, the presence of marked, instead of minute, lateral obliquely divergent dentiform lobes proximo-mesad on the same, the more sharply narrowed pronotum caudad of the supra-coxal expansions, the slightly more slender pronotal shaft, the more elongate acute distal process of the cephalic femora, and the proportionately shorter tegmina and wings, which in length do not equal that of the head and pronotum, while in females of *capensis* the tegmina are at least equal to the length of the head and pronotum combined.

Material now before me shows that *capensis* ranges from the Cape of Good Hope northward to Gallaland, and west to the Gaboon.

Type.—♀; Faradje, Uele District, Belgian Congo. December 19, 1912. (Congo Expedition; Lang and Chapin.) [American Museum of Natural History.]

Size moderately large (total length of body, 82.5 mm.); form typically empusoid, with the shaft of the pronotum very slender, the supra-coxal expansions sharply contrasted and the head conically rostrate.

Head with its occipital production strongly marked, directed dorso-cephalad, but with its cephalic inclination very moderate, the process extending dorsad of the dorsal borders of eyes a distance slightly more than the depth of the head ventrad of the latter point (as 40 to 35), regularly tapering distad but with two encircling and spaced linear constrictions, placed at approximately one-third and two-thirds the distance from the eyes to the apex of the process, the latter being longitudinally quite deeply and narrowly cleft, the resultant paired points sharply acuminate,[31] on lateral surfaces and immediately proximad of the more distal of the two constrictions are placed paired acute-angulate dentiform processes obliquely divergent distad, cephalic

[31] In the unique type the sinistral one has been injured at some stage of growth of the individual, and is in consequence shorter and less acute than the dextral, clearly a condition due to early injury.

face of process with a medio-longitudinal carina which reaches proximad to the ocelli, which latter are placed in a low transverse triangle, moderately elevated above the surrounding surface and each subcircular in outline; facial scutellum in profile with the median point of its dorsal margin strongly produced and subfalcately curving dorso-cephalad, in cephalic aspect the scutellum is roughly trigonal, with its ventral breadth subequal to its median depth, the ventral margin transverse truncate, its dorsal one acute-angulate to the apex of the median production, ventro-laterad the lines of this angulation are continued across the lateral sections of the scutellum as thickly strumose intra-marginal ridges, reaching the lateral margins themselves ventro-laterad, dorsad of which the true margins are straight and less strongly converging dorsad, median tectate angulation of the surface strongly marked; width of head across eyes but slightly less than the depth of the head from the dorsal point of the eyes (as 32 to 35); eyes well rounded as seen in cephalic aspect, not at all prominent, in basal outline subacute-ovate, their breadth in that aspect equal to approximately two-thirds their depth (as 12 to 19). Antennae subsetaceous, slightly longer than greatest head depth, multiarticulate, the individual articles very short.

Pronotum very elongate and slender, of the characteristic empusoid type, the greatest breadth across the supra-coxal dilation equal to slightly less than one-eighth of the pronotal length (as 4.5 to 38 mm.), the slender shaft averaging not quite half the breadth of the supra-coxal expansion; collar equal in length to slightly less than one-eighth of the whole pronotum (as 4.5 to 38 mm.), its average breadth nearly twice that of the shaft, lateral margins straight and subparallel for a short distance, cephalad broadly and evenly rounding to the cephalic extremity, which is low arcuate in outline, and caudad expanding to the broadly and evenly arcuate lateral margins of the greatest expansion, similarly narrowing caudad of this to the narrow and uniform shaft, which briefly and slightly broadens and moderately ascends dorso-caudad to the arcuate caudal margin, immediate borders of lateral margins finely denticulate from (and including) the broadest point to near the caudal extremity, transverse impression shallowly marked except where it outlines the shaft caudo-laterad, medio-longitudinal carina indicated but weakly immediately cephalad on shaft and very briefly so near the caudal margin of the same, at the latter point is also placed a pair of subovate converging and mesad contiguous surface swellings each of which is ovately impressed mesad.

Tegmina subhyaline, becoming opaque and coriaceous toward and in the marginal field, equal in length to 1.13 times that of the pronotum, but slightly shorter than the combined length of the head and pronotum (as 43 to 44.5 mm.), greatest breadth, which is at the distal third, equal to somewhat more than a fifth of the tegminal length (as 9.6 to 43 mm.), in form lanceolate with the greater portion of the costal and sutural margins straight and subparallel, the former strongly arcuate to the base in the proximal fifth, in distal fifth equally arcuate to the rounded subacute apex, sutural margin similarly but somewhat less strongly arcuate to the apex; marginal field with

its greatest breadth not quite equalling one-fifth of the greatest tegminal breadth (as 12 to 63), anal field narrow and elongate, its distal extremity attenuately acute (the anal sulcus subsigmoid distad), reaching distad approximately to two-fifths of the tegminal length from the base. Wings moderately narrow, in repose extending very slightly distad of the tegminal apices, their greatest breadth equal to approximately half their length, apex in outline the same as the tegmina.

Abdomen of the usual empusoid pattern, most of the tergites being strongly acute-angulate produced disto-laterad, the same angles of the sternites similarly but less decidedly developed, while meso-distad the sternites are lobate produced, ranging (distad) in emphasis from broadly rounded to acutely rounded, each median production with a vertical medio-longitudinal sublamellate keel, ultimate and penultimate tergites with the disto-lateral productions very much smaller and less produced than those of the more proximal tergites but somewhat sharper and in consequence more spiniform, distal margin of ultimate tergite low angulate produced mesad; supra-anal plate transverse trigonal, the converging portions of the margin moderately sigmoid, apex roundly lobulate produced, dorsal surface with a medio-longitudinal lamellato-carination; cerci damaged; subgenital plate with the bilabiate rostral extremity moderately compressed.

Cephalic coxae equal in length to eleven-twenty-fifths of that of the pronotum (as 107 to 243), moderately compressed and expanded in vertical plane proximad, regularly tapering distad to the relatively slender distal extremity, internal surface deplanate, extensor border and medio-longitudinal section of external one carinate, the former the more strongly proximad and there with a few scattered denticles, flexor surface proximad tectate and subcarinate, there with a number of small denticles, distal production of coxae very acute and with its external surface subconcave; cephalic femora exclusive of the rather elongate trochanter slightly shorter than the length of the cephalic coxae (as 102 to 107), the trochanter length as 28, in lateral aspect the femora are elongate subtrigonal, the greatest depth, which is mesad, being approximately one-fourth of the length (as 24 to 102), the femoral form strongly compressed, sublamellate dorsad, dorsal line as seen in lateral aspect nearly straight, ventro-external (external flexor) margin with five elongate spaced spines, of which the second from the proximal end of the series is the longest, the margin between the spines, and more weakly so proximad of them, with recurved denticles, external genicular lobe with a pronounced spine, similar to, but smaller than those of the same margin, discoidal spines four in number, increasing in length distad to the third which is twice the length of the more inclined fourth, and which latter is subequal in length to the first, ventro-internal (internal flexor) margin with a series of 21–22 closely placed biseriate spines, their formula for length, reading from distal end, being IIIII(1)IIIIIIIIIIII, internal genicular lobe unarmed; cephalic tibiae without apical claw equal in length to nine-twentieths of the length of the cephalic femora minus coxae, trigonal in cross-section with flexor margins sublamellate, particularly the external, which

bears a closely placed series of 20–21 spines, which regularly increase in length distad and in the same direction become progressively more curved, internal margin with 21–22 closely placed spines which average longer than those of the external margin, increase in length progressively distad and in the same direction approach the curvature and character of the very elongate apical claw; cephalic tarsi incomplete in the type, the metatarsus in length equal to eleven-twentieths of that of the cephalic tibiae without apical claw (as 85 to 155). Median femora slightly more than 1.25 times the length of the cephalic femora (as 23.6 to 18.5 mm.), of the usual very slender rod-like empusoid character, medio-dorsal carina complete, as is that of the ventro-external margin, ventro-internal margin weakly and briefly carinate distad, apical spine pronounced, both genicular lobes acute and spiniform produced, lobe on distal section of ventro-external margin marked, almost as broad as long, its proximal and apical border broadly and uniformly arcuate, distal border straight and weakly oblique, disto-apical point narrowly rounded rectangulate; median tibiae slender, rod-like, in length not quite equal to the femora (as 22 to 23.6 mm.); median tarsi very slightly longer than half the tibial length (as 70 to 135), the metatarsus comprising faintly more than half the total tarsal length (as 37 to 70). Caudal femora and tibiae with the same form, character, carination and lobation as the median ones, the femora slightly shorter than the median ones (as 21.2 to 23.6 mm.), while the tibiae are definitely longer than either the paired femora (as 24.4 to 21.2 mm.) or the median tibiae (as 24.4 to 22 mm.); caudal tarsi damaged.

Coloration.—General color of head and pronotum ochraceous-buff, darkening on pronotal shaft to dull ochraceous-orange, on abdomen and limbs passing to pale lumiere green, on median and caudal limbs to as dark as pale apple green, which may have been the general color in life. Tegmina and wings clear hyaline to subhyaline, except that the marginal field of the tegmina is opaque pale apple green, the wing tips are slightly buffy, and a few faint cloudings of cinnamon-brown are scattered over the area of the discoidal field of the tegmina adjacent to the whitish opaque stigma. Eyes cinnamon-brown, antennae ochraceous-buff. Internal surface of cephalic coxae buffy proximad passing distad to fuscous (also including internal face of distal process), where it is bordered ventrad by russet, a pale buffy elliptical spot slightly distad of middle encircled by general darker base color, external surface of cephalic femora obscurely trifasciate or trimaculate with cinnamon-brown, internal face of same cinnamon-buff distad, evenly darkening proximad to mikado brown (of Ridgway), spines zinc orange, fuscous tipped. Median and caudal femora with distal extremities and lobes light ochraceous-buff with a pair of transverse arcuate fasciae of mummy brown crossing the femur and the whole of the adjacent lobe. Abdomen probably apple green in life, patches of this color remaining.

Measurements.—Length of body, 82.5 mm.; length of pronotum, 38; greatest width of pronotum, 4.5; length of tegmen, 43; greatest width of tegmen, 9.6; length of wing, 39.5; length of cephalic femur, 18.5; length of caudal femur, 21.2.

The type of this species is unique.

Explanation of Figures

Plate III

Figure 1.—*Theopompella congica* new species, ♀ (type); Medje, Belgian Congo; dorsal view of head and pronotum (× 2).

Figure 2.—*Omomantis sigma* new species, ♂ (type); Lukolela, Belgian Congo; dorsal view (natural size). Fig. 3.—Same; cephalic view of head (greatly enlarged).

Figure 4.—*Panurgica langi* new species, ♂ (type); Medje, Belgian Congo; dorsal view (× 1⅛).

Plate IV

Figure 5.—*Panurgica langi* new species, ♂ (type); Medje, Belgian Congo; dorsal view of head and pronotum (× 3¼). Fig. 6.—Same; lateral view of head and pronotum (× 3¼).

Figure 7.—*Hemiempusa phantasma* new species, ♀ (type); Faradje, Belgian Congo; dorsal view (9/10 natural size). Fig. 8.—Same; dorsal view of head (greatly enlarged).

Plate V

Figure 9.—*Humbertiella africana* Rehn, ♀ (type); Cameroons; dorsal view (× 1½).

Figure 10.—*Humbertiella indica* Saussure, ♀; Ceylon; dorsal view (× 1½).

Figure 11.—*Polyspilota ugandana* (Rehn), ♀; Kisumu, Lake Victoria, Kenya Colony; dorsal view of head and pronotum (× 1½).

Figure 12.—*Rhomboderella thorectes* new species, ♀ (type); Central Zambesi; dorsal view of head and pronotum (× 1½). Fig. 13.—Same; cephalic view of head (greatly enlarged).

Figure 14.—*Rhomboderella scutata* (Bolívar), ♀; Palavange, Angola; dorsal view of head and pronotum (× 1½). Fig. 15.—Same; cephalic view of head (greatly enlarged).

Plate VI

Figure 16.—*Chloroharpax modesta* (Gerstaecker), ♀; Ebolowa, Cameroons; dorsal view (× 2¼).

Figure 17.—*Panurgica mende* new species, ♀ (type); Pujehan, Sierra Leone; dorsal view of head and pronotum (× 3). Fig. 18.—Same; cephalic view of head (greatly enlarged).

Figure 19.—*Panurgica feae* Griffini, ♀; Ebolowa, Cameroons; dorsal view of head and pronotum (× 3). Fig. 20.—Same; lateral view of head and pronotum (greatly enlarged).

Figure 21.—*Stenovates spectrum* new species, ♀ (type); Faradje, Belgian Congo; dorsal view (¾ natural size).

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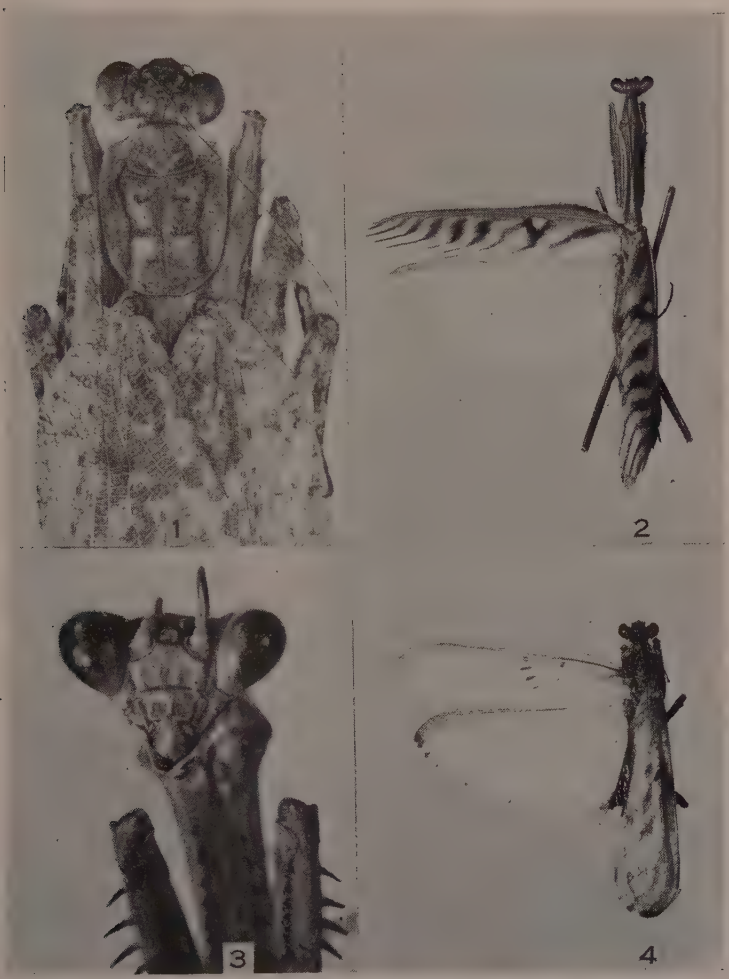
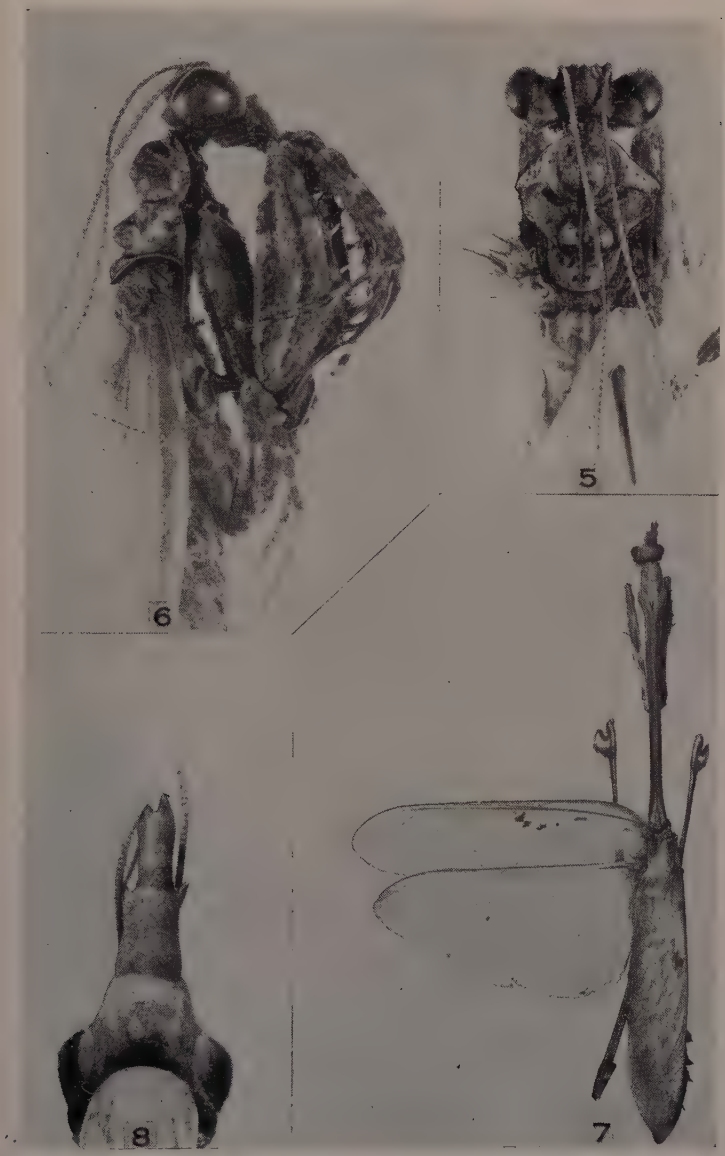


REHN—AFRICAN MANTEIDAE



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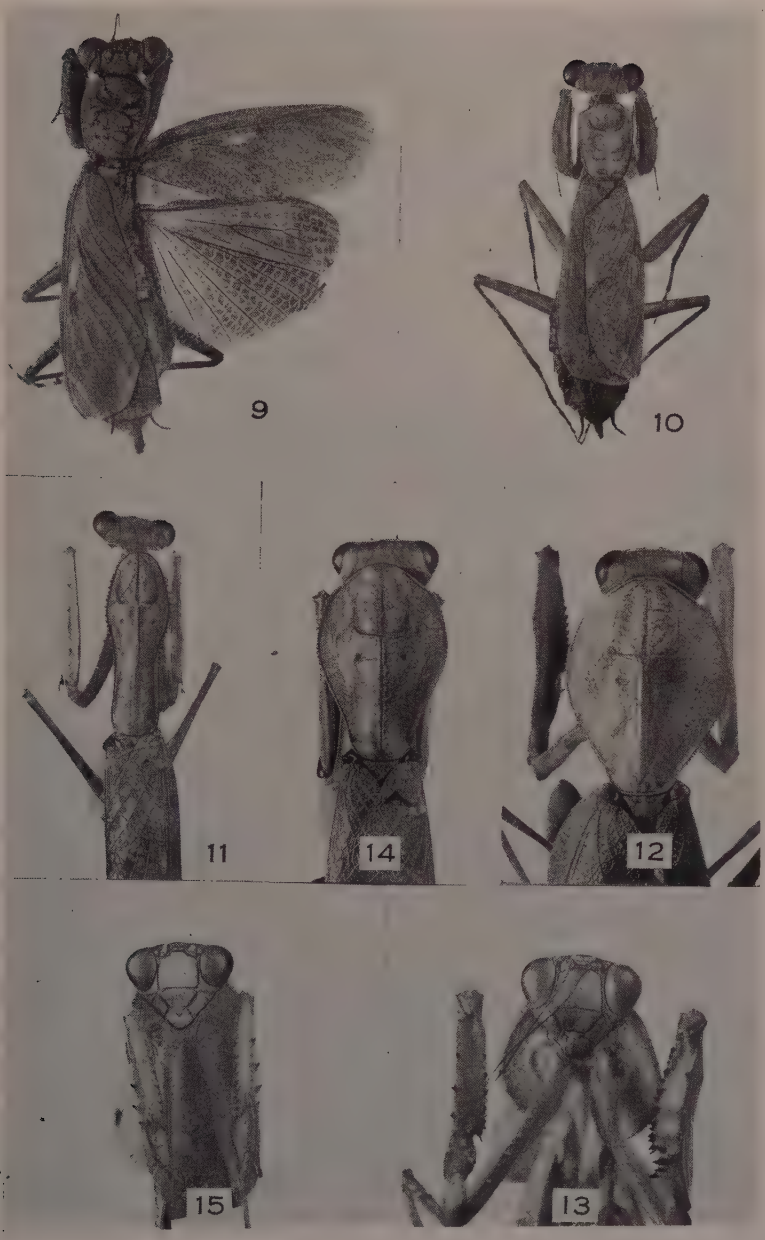
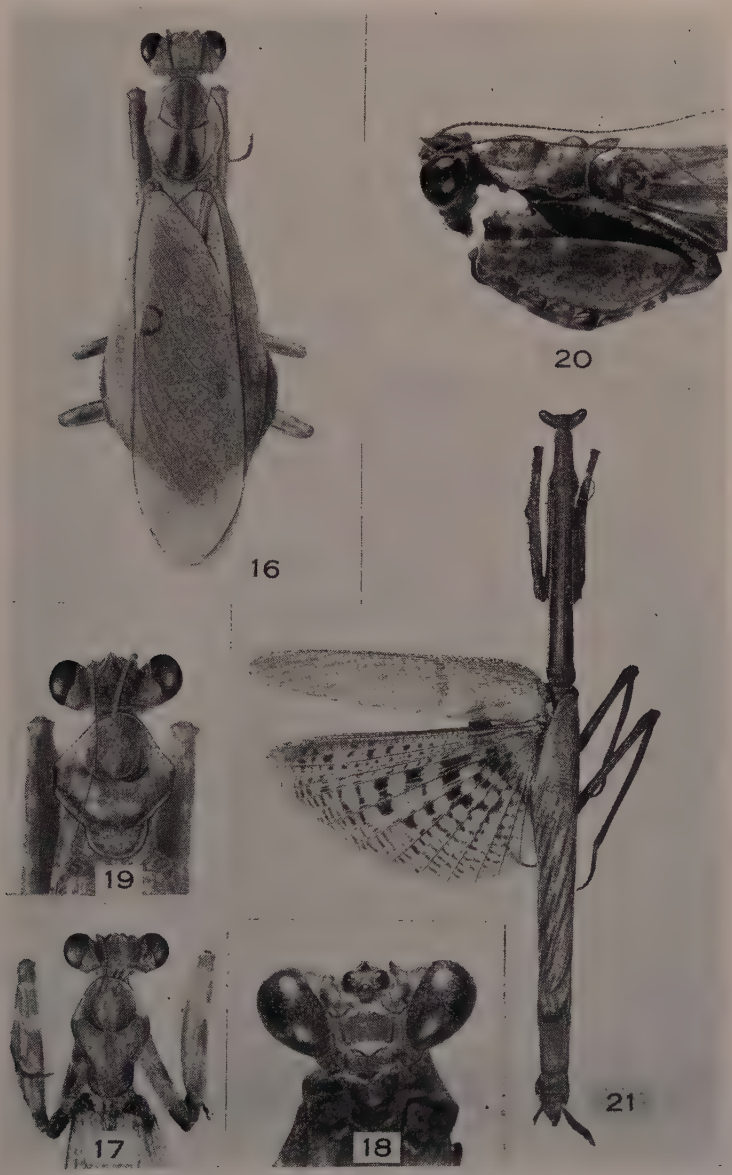


REHN—AFRICAN MANTEIDAE



REHN—AFRICAN MANTEIDAE

A SYSTEMATIC ANNOTATED ARRANGEMENT OF THE GENERA AND SPECIES OF THE NORTH AMERICAN EPHYDRIDAE

(DIPTERA)

IV. The Subfamily Napaeinae

BY EZRA T. CRESSON, JR.

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[At the time of his death, April 8, 1948, the author was preparing the present paper for publication. His long-hand and typed manuscripts have been arranged by the Publication Committee of the Society to correspond with what seem to have been his intentions. The preceding part on the North American Ephydridae appeared in these *Transactions,* Volume LXXII, pages 227–240, issued December 20, 1946.]

[In his Studies on the Dipterous Family Ephydridae, III, these *Transactions,* Volume LVI, 1930, Cresson proposed the name Subfamily Napaeinae] "for a group including *Axysta, Hyadina, Pelina, Brachydeutera, Napaea, Parydra* and possibly *Canace* and allied genera. The group is apparently intermediate between the Notiphilinae and Ephydrinae; probably an offshoot rather from the Ephydrine than from the Notiphiline phylogenetic branch" (l.c., p. 100).

Tribe NAPAEINI new tribe

The species of this tribe are easily recognized, and while forming recognizable species groups (some of which have been treated as distinct genera), these groups are not sharply defined. However, the species themselves, on the whole, are well marked. In

this tribe there are four generic names involved: *Napaea* Robineau-Desvoidy, *Parydra* Stenhammar, *Paranapaea* Hendel and *Chaetoapnaea* Hendel. Here I recognize as genera *Napaea* Robineau-Desvoidy with *Chaetoapnaea* Hendel as its subgenus, and *Parydra* Stenhammar with *Paranapaea* Hendel as a subgenus. However, I am not confident that *Napaea* and *Parydra* will ultimately prove to be considered as distinct genera.

Napaea and *Parydra* have been considered synonymous, but each has a specifically distinct genotype, *Ephydra coarctata* Fallen and *Parydra* (*Ephydra*) *aquila* Fallen respectively. These two species are quite different and I consider them as representing two distinct genera. The new monobasic genera, *Paranapaea* Hendel and *Chaetoapnaea* Hendel were erected on species possessing features which, at that time, to the knowledge of their author, were considered of generic value. *Paranapaea,* erected for *Parydra pubera* Loew, 1860, is characterized by the abnormal development of the pilose vestiture, apparently at the expense of the macrochaetae. *Chaetoapnaea,* erected for *Ephydra pusilla* Meigen, 1830, is characterized by the presence of two, equally strong facial bristles.

NAPAEA Robineau-Desvoidy

1830. *Napaea* Robineau-Desvoidy, Essai Myod., p. 799.
1934. *Napaea* Cresson, Trans. Amer. Ent. Soc., LX, p. 211.

Napaea was erected for two new species, *Napaea stagnicola* and *N. pygmaea.* Of the former, Robineau-Desvoidy recognized two varieties: Var. A, *Napaea major* and Var. B, *Napaea minor.* Much of his description of *stagnicola* suggests the common European *Ephydra aquila* Fallen, 1813, the genotype of *Parydra,* and from other features we can be reasonably sure that he had one of the species belonging to the genus as here treated. There is no doubt but that he had more than one species under *stagnicola,* but he gives no characteristics by which one can definitely distinguish which, of the known species, they were. However, Haliday, 1839 (Ann. Nat. Hist., III, p. 407) cites variety A as a synonym of *Ephydra coarctata* Fallen, 1813, and variety B as possibly synonymous with *E. fossarum* Haliday, 1833. As none of Robineau-Desvoidy's types have been preserved, and as we have no means

of positively identifying his species otherwise, it remains only to accept some author's determination, whether right or wrong. Westwood in 1840 (Syn. Gen. Brit. Ins., p. 153), evidently following Haliday in recognizing this synonymy, designated *coarctata* as the type-species of *Napaea,* thus giving us a basis upon which to work.

Of *Napaea pygmaea,* the other species originally included in the genus, we know nothing further. It was described as being "2/3 de ligne" in length (about 3.5 mm.), thorax jet black, abdomen bluish black, wings with four small spots, one of which is contiguous with the costa. I cannot recognize this as describing any *Napaea* or *Parydra* known to me from Europe.

My own analysis of the forms of *stagnicola* does not offer any more satisfactory solution than is given by Haliday. We would not better the situation by taking exception to his determinations, especially as they have been well recognized in the literature and they are followed here.

Haliday (1839) used *Napaea* for a subgenus of *Ephydra,* including both *coarctata* and *aquila.* Stenhammar (Handl. K. Sven. Vet. Akad., 1843, p. 187, 1844) proposed *Parydra* for the same group, ignoring both Robineau-Desvoidy's and Haliday's use of *Napaea.* Macquart (Hist. Nat. Ins., Dipt., II, p. 535, 1835) considered it synonymous with *Ephydra.* It was again used by Walker (Ins. Brit., II, p. 263, 1853) following Haliday. Although having priority over *Parydra, Napaea* was not used, except as a synonym, until 1910 when Hendel (Wien. Ent. Zeit., XXIX, p. 312) reinstated the name over *Parydra.*[1]

The salient features of this genus are the straight, not convex, obliquely protruding profile of the face with the prominent epistoma and with a more or less appreciable interfoveal carina; the strongly developed macrochaetae, particularly those of the frons where the ocellars are almost as strong as the arista and at least attain the lunular margin of the frons. On the mesonotum we find several distinct bristle-like setae in the dorso-central series, not including the prescutellars; also an appreciable presutural

[1] Rondani (Dipt. Ital. Prod., I, p. 130, 1856) used the name *Napaea* for a generic concept based on *Ephydra quadrata* Fallen, and continued *E. coarctata* in *Ephydra.* This treatment is, of course, erroneous and is referred to here only as a matter of record.

and anterior notopleural and well-developed mesopleural. This strengthening in the macrochaetae, however, is also found in some species of *Parydra,* but is not typical of that genus. Scutellum typically with an unarmed, median, conical tubercle, the apical bristles never tuberculate at base.

I am restricting *Napaea* to those species having a more or less distinct, apical, unarmed, scutellar tubercle and the second vein appendiculate, but I have seen specimens without such an appendage, belonging to a species in which the scutellar character is strongly developed.

Scutellum tuberculate, second vein appendiculate, face oblique..... Subgenus **Napaea**

(Examples: *halteralis,*[2] *appendiculata,*[2] *quadripunctata, littoralis, coarctata, socia,*[2] *varia* [2]) (coarctata group)

Scutellum not tuberculate at apex, second vein not appendiculate..... Subgenus **Chaetoapnaea**

Second vein acutely bending into costa

(Examples: *pusilla, paullula,*[2] *fossarum, nigripes, concors*) (pusilla group)

Second vein paralleling costa, abruptly bending into it

(Examples: *nubecula, borealis,*[2] *nigritarsis, hulli,*[2] *abbreviata* [2]) (abbreviata group)

Subgenus **Napaea** (Robineau-Desvoidy)

1949. Cresson, as above.

Coarctata Group

In the group which I call the Coarctata group after its type species of Europe, the salient feature is the long appendiculate second vein which generally enters the costa rather abruptly, after emitting near its tip a longer or shorter appendage into the submarginal cell, making the second section of the costa fully, or almost twice, as long as the third. The appendage is usually present, at least rudimentarily as a nodule of the vein, rarely without any brace. It is usually accompanied by a distinct cloud, except in *coarctata* where it is seldom discernible, but is always present if the appendage is undeveloped. This appendage occurs normally in *varia, halteralis, appendiculata* and *socia,* questionably present in *hulli* and *abbreviata,* of which species I have not suf-

[2] North American species treated in this paper.

ficient series (only 6 specimens) to show any variation in this character. However, on the strength of their general similarity to the other species, I suspect that they have the tendency to produce an appendage. On the other hand, the short stump and short second vein may be characters of a group within this tendency. The two cross veins are also clouded and are accompanied by more or less noticeable whitish areas. Veins in general heavy, more or less wavy.

The facial foveal depression is generally well marked in its lower limits. Fronto-orbital bristles set on the posterior half or third of the parafacials, proclinate frontal seta on anterior portion of parafacials minute or wanting.

Scutellum with a more or less developed median, unarmed, apical tubercle, the apical bristles with or without a minute tubercle at base.

Napaea varia (Loew)

1863. *Parydra varia* Loew, Berl. Ent. Zeits., VII, p. 326. (Cent. 4, no. 100.) [Alaska.]

1863. *Parydra varia* Loew, Dipt. Amer. Sept. Ind., I, p. 210. (Cent. 4, no. 100.)

A more or less shining species, known to me by ninety-four specimens from Washington, Oregon, Idaho, California, Montana, Michigan, Vermont, New Hampshire and Maine.

Sparsely pollinose, with short, heavily veined, wrinkled, infuscated wings; the crossveins of which are accompanied by four to five conspicuous niveous spots.

Antenna III more or less, the apices of femora, extremities of, and sometimes entire tibiae, and all tarsi, ferrugineous. Halteres pale, yellow. Ocellar tumor quite prominent; frontalia opaque black; face more or less cinereous to niveous, particularly in the foveae. Facial carina quite sharp, because of the mesal development of the foveae, but not concaved in profile. However, this character varies, a few individuals showing a very weak carina, thus giving a concaved profile and throwing the epistoma into strong prominence.

Mesonotum typically showing numerous cinereous stripes and distinct cinereous spot at mesal sutural angles. Scutellum narrow and very convex, with or without unarmed apical tubercle between the closely set apical bristles.

Wings with dense clouds at crossveins and at the appendiculated apex of vein II; costal section II distinctly longer than section III.

This species was originally described from several [3] males from Sitka, Alaska, but the present location of any one of this type series is unknown to me. I could not find them in the Loew Collection. However, I feel certain of my determination of the species, particularly noting, in Loew's description, the white pollinose face, diluted antennae, strongly convex scutellum, pale apices of the femora, extremities of the tibiae, and the guttate appearance of the wings with their five white spots, all of which are the characteristic features of the species.

Napaea halteralis Cresson

1930. *Napaea halteralis* Cresson, Entom. News, XLI, p. 81. [Washington.]

A small, rather dull, black species, known to me by nine individuals from Washington, Idaho and California.

The wings have vein II long, abruptly angled into the costa, with conspicuous cloud and often appendiculated at its tip; crossveins and generally tips of veins III and IV also clouded.

Similar to *appendiculata* (Loew) but more shining, the vestiture darker, the face more definitely bifoveated with sharper carina, somewhat concaved in profile and with sparingly whitish pollen not obscuring the slightly metallic colored surface. From *paullula* (Loew) the species is distinguished by the broadly rounded scutellar apex.

Napaea appendiculata Loew

1878. *Parydra appendiculata* Loew, Zeit. f. ges. Naturw. 51: 202.

[Known to the author by 240 specimens from Washington, Oregon, California, Idaho, Utah, Arizona, Wyoming, Colorado, New Mexico, South Dakota, Kansas, Texas, Michigan, Illinois and Quebec. Type: Texas, M. C. Z., No. 11167.]

Rather uniformly ochraceous to ochraceous brown, vestiture noticeably dense on face, pleurae and venter; vestiture of pleura ventrad, of mesopleura somewhat cinereous. The vestiture is more yellowish than in *socia* and more dense, sometimes quite obliterating the gloss, the mesofrons in consequence less in contrast with the frontalia, but the ocellar tumor on the contrary is more opaque. On the face and tormae the vestiture is uniform, yellowish, much more dense than on mesofrons, the gloss seldom or but slightly perceptible. On the mesonotum it is sometimes quite dense in

[3] I conclude that Loew had several specimens before him, as he mentioned variation in the color of the tibiae.

certain aspects, becoming more so as three interdorsocentral vittae, particularly pronounced at the cephalic and caudal extremities, and becoming grayish ventrad at anterior margin and as two antesutural or interdorsocentral spots and one at each mesal angle on the suture. On the pleura it becomes grayish to olivaceous ventrad. On the scutellum it is as on mesonotum; on the abdomen and legs it is similar to that of *socia.*

Face in profile oblique, straight or slightly concaved, shorter than in *socia,* about .4 the height of head, thus throwing the position of antennae less dorsad; in width about as broad as high. The narrower cheeks and lower-set bristles reduced, the lower medifacial area and the foveae are not so marked nor so broadly dilated mesad, thus not indenting the carinal profile, and the interfoveal hump is less noticeable. However, the dense vestiture considerably obscures the exact definition of the sculpturing. Structurally similar to *socia,* but head not so broad in proportion to its height, eyes less prominent, frontalia less depressed. Cheeks about as broad as antenna III.

Mesonotum slightly broader than long, the few setulae not appearing so strong owing to the great density of the vestiture, with at most faint lighter stripes.

Scutellum rather broad apicad, more broadly truncate than in *socia,* with at most a weakly developed apical tubercle, sometimes scarcely suggested; apical bristles longer than their distance apart, lateral setulae shorter, scarcely attaining bases of apical bristles.

Abdomen sparsely grayish; lateral margins subacute.

Wings about twice as long as broad, infumated with faint clouds at crossveins, second section of costa about 1.5 times the third section, second vein long, almost straight to a well-developed appendage, then rather abruptly acutely angled into the costa; posterior crossvein oblique, its extension would intersect the costa at, or slightly beyond, the second vein. Halteres well developed, yellowish white.

Legs: ground color is as in *socia,* but the tarsi are ferruginous to tawny basally; more slender than in *socia,* midcoxa with long, black bristle, midfemora with posterior flexor cilia generally well developed distad of minute, closely set, suberect spinules.

♂. Abdomen with lateral margins well turned under, but not sharp.

♀. Similar but, as usual, larger and more robust than the ♂, with the usual secondary sexual differentiation; flexor cilia of femora not marked.

In this species we seem to have the American relative of the European *quadripunctata* (Meigen), which it resembles in general appearance, having the pale bristles on the fore coxae and black bristles on the midcoxa; differing in its slightly smaller size, smaller lateral scutellar setae, sharp abdominal margins, shorter second costal section and the well-developed flexor ciliation on the midfemur of the males.

Napaea socia Cresson

1934. *Napaea socia* Cresson, Trans. Amer. Ent. Soc., LX, p. 213. [Calif.]

A western species known to me by 44 specimens from California and a few (19 +) from Washington and Oregon.

A species similar to *varia* in general, particularly in the narrow, convex, acutely pointed scutellum of the females, but differing in that the wings are less maculate, less wrinkled, and lack the 4–5 conspicuous niveous spots at the crossvein. Second vein rarely without an appendage, but there is always a cloud at its bend into the costa.

Subgenus **Chaetoapnaea**

1930. *Chaetoapnaea* Hendel, Konowia, 9, p. 150. Type: *Ephydra pusilla* Meigen, Palaearctic region.

Pusilla Group

Wing veins rather long, not appreciably wavy; second vein enters the costa acutely, usually without a cloud and never appendiculate. Head and face short, broad, cheeks narrow, frons at most slightly depressed, thus the ocellar tumor not especially prominent; bristles well developed. Scutellum without a noticeable apical tubercle.

Napaea (Chaetoapnaea) paullula (Loew)

1862. *Parydra paullula* Loew, Monogr. Dipt. No. Amer., I, p. 167. [No locality given.]

1878. *Parydra paullula* Osten Sacken, Cat. Dipt. No. Amer., Smithson. Misc. Colls., XVI (2), p. 203. [United States.]

This rare species is known to me by nine specimens, including the type, from eastern and western Canada, New Hampshire, New York, Pennsylvania and Illinois. Coquillett's record [4] from Popof Island, Alaska, I cannot substantiate, not having seen his material. Osten Sacken (1878) is the first to give any locality, and that is very general (United States). I found in the Loew Collection, under this name, a specimen in poor condition (immature, as Loew states) labelled "Middle States" and which seems to be a male, not a female as originally stated. This individual I have designated the type (Museum of Comparative Zoology, no 11171).

A small (2 mm.), dark species including the halteres and tarsi. Vestiture, mostly brown, and very sparse on the dorsal surfaces, but face white, and ventral parts rather grayish.

[4] Proc. Wash. Acad. Sci., II, p. 462, 1900; also Rept. Harriman's Alaska Exped., II, p. 76, 1904. [Reprint of his 1900 paper.]

Eyes large round and prominent; face somewhat aeneous, about as long as broad, oblique in profile, at most slightly concaved, with very prominent epistoma; with two nearly equally long facials, the second one well ventrad, at the very narrow cheeks.

Mesonotum and scutellum both short, broader than long; the latter with broad apex, the apical bristles widely separated. Wings well marked with large whitish areas at the clouded crossveins; costal section II but slightly longer than III; vein II acutely curving into the costa with distinct cloud at its tip.

Napaea (Chaetoapnaea) vulgaris new species

[The author left a list of 113 specimens, under the name *vulgaris,* from Alaska, British Columbia, Alberta, Washington, Idaho, Nevada, Utah, Montana, Wyoming, Colorado, Manitoba, South Dakota, Kansas, Minnesota, Wisconsin, Michigan, Ontario, Indiana, Ohio, Quebec and Pennsylvania, and indicated as types three specimens from Yellowstone Lake, Wyoming. Many of these 113 specimens were among those on which he was working at the time of his death and many of them bear his pin-label "*Napaea vulgaris* Cr. det. Cresson 1948."

No specific description of *vulgaris* has been found among his papers, but he drew up three keys to North American species of *Napaea,* two of which include *vulgaris.* These two keys, because they do not include all the North American species treated in this paper, are not reproduced here; such of their rubrics as apply to *vulgaris* and those of the third key (to be found on page 236) which belong to *vulgaris* (as shown by a comparison of his labeled specimens therewith) are brought together as the following description:]

Face distinctly sulcate, opaque or slightly shining, bronze and brown, in profile straight, oblique to epistoma, slightly emarginate above, ocellar bristles well developed. Head broader than high (55–62 vs. 38–43).

Scutellum triangular, not tuberculate, narrower apicad, scutellar bristles well separated. Halteres pale. Femora and tibiae black, tarsi pale brown to black.

Wings hyaline or only the crossveins clouded, second section of costa hardly twice as long as the third; second vein not clouded, entering the costa acutely, seldom appendiculate, generally ending beyond the posterior crossvein; penultimate section of the fourth vein shorter than the ultimate section; marginal cell not noticeably broad.

Length, including wing, 3.35–4.67 mm.

Holotype.—Male; Yellowstone Park, Yellowstone Lake, 23 July, 1934, A. L. Melander; Acad. Nat. Sci. Phila., No. 6629.

Allotype.—Female; same data.

Paratype.—Same data.

Abbreviata Group

A group of species having short wings and a short second vein, without appendage or cloud, which curves into the costa; it generally runs farther from the costa than from the third vein, the marginal cell being broader than the submarginal just distad of the anterior crossvein.

Napaea (Chaetoapnaea) metallica (Cole) new combination

1921. *Parydra metallica* Cole, Proc. Cal. Acad. Sci., (4), XI, p. 176, figs. 4, 4a. [Pribilof Islands, Alaska.]

1923. *Parydra metallica* Malloch, No. Amer. Fauna, no. 46, p. 222. [Pribilof Islands.]

This and the following species should probably be assigned to a distinct genus, but the rather poor condition of the material deters me from so treating them. [By the author's synopsis on page 228, these two species fall within the Pusilla group of *Chaetoapnaea.*]

The present species was originally described from the male sex, but it is known to me only by three females from the type locality, St. George Island, Bering Sea, Pribilof Islands, VI, 4 and 16, 1914, (G. D. Hanna), [USNM].

An entirely black species, well defined by the original description. The face is prominently carinate, nasute in profile with deep foveae. The wings are distinctly yellow, without any intervenous infuscation or crossvein clouds; second vein very long, parallel to the third vein, making the third costal section four to six times as long as the second.

Napaea (Chaetoapnaea) yukonensis new species

Similar to *N. metallica* (Cole) in general, particularly the venation of the wings, but the surfaces are subopaque, rather shagreened. Frontalia broad, parallel-sided, opaque black; face about as broad as frons, weakly carinate and foveae shallow, in profile straight, vertical; cheeks about .5 as broad as antenna III; the latter not unusually broad as it is in *metallica;* mouth very large; clypeus narrowly visible. Scutellum flat with sharp margins and broadly truncate apex, not shining. Wings (folded together against the abdomen) appear similar to those of *metallica* both in color and venation.

Length, 2.5 mm.

Type.—Male; Bethel, Yukon, Alaska. September 25, 1917. (A. H. Twichell.) [U. S. National Museum Collection, No. 59033.]

Paratype.—Male; with same data as type.

Napaea (Chaetoapnaea) borealis new species

A comparatively shining species similar to *paullula* (Loew) with a somewhat cyanescent face not much obscured by the white vestiture; markedly wrinkled wings with short second vein.

Extremities of the tibiae and all tarsi except apices, tawny to brown. Halteres dark, with pale margins or occasionally the knob entirely paler. Wings strongly wrinkled and somewhat infuscated, with the crossveins and tips of veins III and IV more or less clouded; the whitish areas at the crossveins rather distinct.

Shining to polished; the vestiture sparse and golden brown on frons, mesonotum and scutellum, denser and mixed with gray on the cheeks, upper part of the pleura, and abdomen; sparse and whitish on the face and legs, more dense and white on parafacials, cheeks and lower part of pleura. Frontalia narrow, opaque brown.

Head slightly longer than high (about as 25:21), much broader than high (about as 35:21). Eyes large, their slightly greater diameter almost horizontal. Frons at vertex about .6 width of head; much narrower cephalad; vertex but slightly depressed; mesofrons and parafrons slightly relieved; ocellar tumor weak; frontorbitals as strong as ocellars and close to orbits; the opaque frontalia narrow. Face about .3 width of head and about as long as broad; in profile strongly protuberant and oblique, straight, of slightly concaved contour; foveae weak but rather emphasized by their denser vestiture; intrafoveal hump very weak; parafacies linear, scarcely dilated ventrad. Facial bristle very strong, with a few weak setae below. Cheeks about as broad as antenna III; buccal bristle weak but distinct.

Thorax and its macrochaetae normal for the genus. Scutellum much narrowed apicad, with at most a very weak tubercle, the apical bristles rather approximate. Abdomen with sharp lateral margins.

Legs rather slender, their bristles and setulae weak, inclined to paleness; lateral seta of mid coxa black and strong. Wings with rather heavy veins; vein II rather short, parallel to costa and abruptly curving into the costa, generally without appendage or cloud; costal section II somewhat longer than III.

Length, 3 to 3.8 mm.

Type.—Male; Priest Lake, Idaho, August 2, 1916, (A. L. Melander). [Academy of Natural Sciences of Philadelphia, No. 6630.]

Paratypes.—1 ♀, 1 ♂; Tacoma, Washington, August 27, 1911,

(A. L. Melander). 3 ♀; Ilwaco, Washington, June 28, 1925(?), July, 1917, (A. L. Melander).

The following series seem to be of the same species: a female, Mt. Constitution, Washington, VII 28, (A. L. Melander), the wings apparently rather evenly infumed, crossvein clouds less marked; mesonotum evenly brown pollinose. Another female from Paradise Park, Mt. Rainier, Washington, VIII (A. L. Melander), which is not in good condition.

Napaea (Chaetoapnaea) abbreviata (Loew)

1861. *Parydra abbreviata* Loew, Berl. Ent. Zeits., v, p. 357. (Cent. 1, no. 97.) [Pennsylvania.] (Republished in Dipt. Amer. Sept. Ind., Cent. 1, no. 97, p. 51, 1861.)

1862. *Parydra abbreviata* Loew, Monogr. Dipt. No. Amer., I, p. 168.

A small, dark, rather shining species, known to me by five individuals from Massachusetts, Pennsylvania and Virginia.

The halteres, apices of femora, entire tibiae and tarsi and somewhat of the antennae are the only parts that are pale. The frons and face are opaque, ochraceous brown, with no marked frontalia. Wings comparatively short and broad, rather uniformly fuscous with clouds at the crossveins and tip of vein II, the tip of vein II sometimes with appendage. The anterior crossvein with two white spots and the posterior crossvein with three such spots, and often another white spot beyond the latter crossvein bisected by vein IV. Costa II not much, if at all, longer than III.

The type is a male, in good condition from Pennsylvania, in the Loew Collection (M. C. Z., No. 11166).

Napaea hulli Cresson

1934. *Napaea hulli* Cresson, Trans. Amer. Ent. Soc., LX, p. 212. [Mississippi.]

This may be merely a pale form of *abbreviata* (Loew). It is known to me by one individual, the type.

It is very similar to *abbreviata,* differing most noticeably by the entirely pale legs. We also find the mesofrons not contrasting with the frontalia and the third costal section longer than the second, all of which may be merely variable features.

Key to the North American Species of the Genus Napaea

1. Wings with general yellow infumation, without any clouds or white spots; vein II very long, making costa II four to five times as long as costa III.....2

Wings clear or faintly infumated, with crossveins more or less clouded; vein II not so long, costa II seldom three times as long as costa III.....3

2. Shining or sparingly pollinose species, scutellum polished. **metallica** (Cole)

Subopaque, shagreened species, including the flat scutellum. **yukonensis** new species

3. Wings short, well marked, costa II short, posterior crossvein far beyond the tip of vein II.....4

Wings normally long, costa II generally longer than costa III, posterior crossvein not, or but slightly, beyond the tip of vein II..5

4. Legs partly pale, costal section III shorter than II. **abbreviata** (Loew)

Legs entirely pale, costal section III longer than II...**hulli** Cresson

5. Marginal cell broader than the submarginal at the anterior crossvein; head noticeably broader than high, tarsi pale. **borealis** new species

Marginal cell not noticeably broad.....6

6. Vein II more or less acutely entering the costa, rarely with an appendage.....7

Vein II long, paralleling the costa and more or less abruptly entering it, generally with an apical cloud and appendage.....8

7. Costal section II not much longer than section III; scutellum short, subquadrate, apex broad.....**paullula** (Loew)

Costal section II hardly twice as long as the third; scutellum triangular, narrower apicad; halteres pale.....**vulgaris** new species

8. Wings much wrinkled, with 4–5 small, round, white spots at the crossveins; face overcast with white vestiture; scutellum elongate, very convex and acute apicad.....**varia** (Loew)

Wings not conspicuously wrinkled, white spots or areas at crossveins large, not conspicuous.....9

9. Face opaque ochraceous.....**appendiculata** (Loew)

Face more or less shining, not opaque, overcast with brown or white.....10

10. Head and face very broad, broader than high, face in profile concaved, scutellum broadly rounded at apex.....**halteralis** Cresson

Head and face not much, if at all, broader than high, face in profile mostly convex (or convex above and below, the two convexities separated by a concavity above mid-height; scutellum rather narrow apicad and generally with a small apical tubercle. **socia** Cresson

In arranging the species, I am considering the tendency of the second vein to produce its appendage. This throws together *paullula* and *vulgaris,* which I think are related, at least more so to each other than to the other species. As an intermediate I

place *borealis* with *hulli,* and *abbreviata* next. These I have not seen with any suspicion of an appendage, but on their similarity to *appendiculata* in many respects, I suspect specimens will be found with such a character. From these short-veined species we arrange *varia* to *socia* on their successive increases in the length of the second vein. This throws *socia* near its apparent relations in the Breviceps group of *Parydra.* In *borealis* we seem to have an internectant between the Fossarum group and the Coarctata group, but more approaching the latter. The variability of this appendiculate condition destroys its value as a specific character.

PARYDRA Stenhammar

1844. *Parydra* Stenhammar, Handl. K. Sven. Vet. Akad., 1843, p. 187.[5]

Parydra was erected by Stenhammar for *Ephydra aquila* Fallen, ignoring both Robineau-Desvoidy's and Haliday's use of *Napaea,* and has been used by subsequent authors for this group until 1910, when Hendel (Wien. Ent. Zeit., XXIX, p. 312) reinstated *Napaea.* Later, in 1933 (Verh. zool.-bot. Ges. Wien., LXXXI, p. 15), he removed that name and used *Parhydra* which, he stated, is the correct form of Stenhammar's *Parydra,* a treatment not followed in the present paper.

We distinguish the species of this genus from those of *Napaea* by the evenly convex face below an interantennal hump, the definite epistoma rarely the most prominent part of the facial profile, but on the contrary the lower portion of the profile is generally vertical. Here we do not have the straight and oblique facial profile of *Napaea.* Although showing considerable variation, we find a certain uniformity in the facial structure. It is quite broad, evenly convex, with a more or less distinct transverse depression appearing as a contiguous mesal extension of the foveae, quite noticeable in profile as an indenture just below the interantennal hump, the mesofacies below this depression being evenly convex, equally so in both dorsal and lateral aspects. However, this depression may

[5] Although *Parhydra* is the correct transliteration of the Greek πάρυδρος, *Parydra* is the name proposed by Stenhammar and has been used exclusively prior to Hendel's emendation and by most authors since. I do not consider this error in transliteration sufficient ground for changing this long-established name.

be almost obsolete, and in only two species known to me is it obliterated by an appreciable carina.

We find all degrees of development in the macrochaetae and scutellar tubercles. Typically, *Napaea* has a distinct, apical, unarmed tubercle, which is absent in typical *Parydra*. On the other hand, we find typical *Parydra* with well-developed, paired, armed, scutellar tubercles and the lateral tubercles of *Parydra* are entirely absent in *Napaea*.

Parydra is characterized by the broad, ample, convex face, not becoming noticeably prominent at the epistoma in profile. There is no distinct, unarmed, apical, scutellar tubercle, but the apical bristles and sometimes lateral setae are situated on distinct marginal tubercles. I know of no instance of an appendage to the second vein in species of this genus.

Morphology.—Head always broader than high, with greatest width above the middle; in cephalic aspect subtrigonal, with width at oral margin about one-half its greatest width. Eyes prominent, usually obliquely ellipsoid, rarely round, bare. Frons narrowed cephalad, sometimes depressed, particularly at vertex, the areas not sharply defined except by the more opaque frontalia. Vertex not sharply defined, rounding into the occiput. Ocellar tumor usually pronounced, with ocellar triangle longitudinal; ocellars situated just caudad of line of anterior ocellus. Mesofrons, when marked, apparently acutely trigonal, attaining lunular margin, bare; frontalia usually defined by their greater opacity. Parafrons with two cephalo-laterally inclined orbitals and an occasional third, anterior, more proclinate orbital. Lunule not noticeable. Face relatively broad, narrowest just caudad of antennae, with orbits strongly flaring to relatively broad buccae; mesofacies ample, rather evenly convex in dorsal and lateral aspects, with a more or less distinct, weakly tuberculose, interantennal hump, below which there is often a transverse concavity, that is more evident in profile and dorsally limiting the generally obsolete interfoveal convexity or obtuse carina. Epistoma not particularly prominent, foveae present as shallow indentations which sometimes extend obliquely mesad (in one species is contiguous as a transverse sulcus); facialia indistinct, almost linear, evanescing ventrad, becoming a groove terminating at the post-buccal oral margin, bearing a distinct, mesally or ventro-mesally curved bristle and a few setae or hairs in the series; sometimes two equally strong bristles are present; parafacies narrow dorsad, moderately dilating ventrad; postbucca ample, noticeably bullate at caudo-ventral angle; posterior orbital area not developed, without cilia. Occiput flat to slightly convex below. The head not closely applied to thorax.

Antennae short, comparatively approximate, diverging, subdecumbent, situated about on center line of eyes; segment I very short but discernible;

II about as long as broad, without proclinate bristle but with dorsal seta; III generally slightly longer than broad, bare; arista micropectinate beyond the thickened basal third.

Mouth moderately large, with lateral margin horizontal in profile, not concaved at epistoma; tormae generally broadly exserted, proboscis stout, with chitinous bulbous base, palpi rather cylindrical.

Thorax about as long as broad and as broad as head, not particularly oblique in profile. Mesonotum convex, as long as broad, its pre- and postsutural widths as 2:3, sparingly setulose, the setulae in the dorsocentral series sometimes bristle-like, but no well-developed acrostichals or dorsocentrals present; the prescutellar dorsocentral, presutural, postalar, posterior notopleural, one marginal mesopleural and one sternopleural present when the macrochaetae are well developed, but otherwise these may be indistinguishable. Mesopleura and sternopleura microsetulose. Scutellum setulose, convex, very turgid, with two apical bristles and a lateral curved seta approximate to apex; the apical bristles typically tuberculose basally, sometimes also the lateral setae, and in some species there is an apical unarmed tubercle.

Abdomen as broad as thorax; segments rather subequal in length; genital segment not conspicuous.

Legs simple, or femora in the males with noticeable postflexor cilia of fine subappressed spinules.

Wings with rather strong veins; costa not noticeably setose, terminating at vein IV, alula auriculate, posterior crossvein more or less oblique.

Color.—All the species of this genus known to me are for the most part black; the shining dorsal surfaces more or less, but rarely totally, subdued by the brown to grayish pollinose vestiture, always more dense on the face, pleura and venter, rather sparse on the legs except the usually silvery patches on the external surfaces at the extremities of the tibiae. Squamae sordid to whitish. Wings generally with some clouding over the two crossveins, accompanied by whitish areas when there is a decided general infumation. Rarely any strong metallic colors present.

The species of this genus, as is also true for *Napaea,* are to be found quite commonly about fresh water, on the stones and moist banks of shady creeks and ponds.

Bituberculata, quadrituberculata and *breviceps* are the more common eastern species, while *nitida* seems to hold this place among the western species.

Unituberculata Group

The species constituting this group have some facial resemblance to those of the subgenus *Napaea,* while on the other hand they have, on the whole, features which influence me in collating

them in a distinct group of the subgenus *Parydra*. The distinctive character of the group is the rather elongate, apically attenuated scutellum, which produces a distinct unarmed tubercle between the apical bristles. Some species of the Breviceps group have a suggestion of such an unarmed tubercle, but it is very weak.

The component species are *vanduzeei, parva, aurata, unituberculata* and *imitans*.

Parydra vanduzeei Cresson, new combination

1933. *Napaea vanduzeei* Cresson, Entom. News, XLIV, p. 68. [New York.]

A species known to me by three type specimens from western New York. It is somewhat similar to *pinguis* superficially, but may be easily distinguished by the broad, almost flattened cinereous face and the ferruginous tibiae. The mesonotum has one to two postsutural dorsocentrals; the scutellum with a distinct, unarmed, apical, conical tubercle. Wings strongly infumated, the crossveins deeply clouded with accompanying whitish areas well marked.

The female type, from Niagara Falls shows a very short appendage into the submarginal cell near the tip of the second vein. The two male paratypes, from East Aurora, do not show any distinct appendage or crossvein as does the type, but one has a crossvein near the tip of the second vein in both wings, connecting it with the costa.

Parydra parva new name

1934. *Napaea undulata* Cresson, Trans. Amer. Ent. Soc., LX, p. 212. [District of Columbia.] Not *Parydra undulata* Becker, 1926.

A small species (2.5 mm. long), known to me by the female type, in the United States National Museum Collection. It is readily recognized by its small size, wing veins strongly undulating, the second vein short, making the second section of the costa much shorter than the third; the second section of the fourth vein longer than the third.

Parydra aurata Jones

1906. *Parydra aurata* Jones, Univ. Cal. Pub. Ent., no. 1, p. 154. [California.]

A western species, known to me by about 300 specimens from Utah, Idaho, Washington, Oregon, California, and New Mexico.

The facial profile is quite pronounced, with a somewhat nasute hump. The scutellar, unarmed tubercle is weak but evident.

The species was described from San Francisco and the type (♂) is in the Collection of the California Academy of Sciences (holotype No. 4106, allotype No. 4107, present selection); and there is also one male paratype in the collection of the Academy of Natural Sciences of Philadelphia.

Parydra unituberculata Loew

1878. *Parydra unituberculata* Loew, Zeits. f. Gesam. Naturw., Berlin, LI, p. 200. [District of Columbia.]

1928. *Parydra unituberculata* Leonard, Mem. Cornell Univ., no. 101, p. 859. [New York.]

This species is known to me by forty-five individuals from Connecticut, New York, New Jersey, Pennsylvania, Delaware, Virginia, and West Virginia. It is rather scarce in collections.

The species was based on the female sex, and the type is in the Loew Collection (M. C. Z., No. 11173).[6] The other female is in the same collection.

Among the species having the apical, unarmed, scutellar tubercle, this one is recognized by such tubercle being cylindrical, and nodiform at its tip, and the ultimate section of the fourth vein being scarcely longer than the penultimate section.

Parydra imitans Loew

1878. *Parydra imitans* Loew, Zeits. f. Gesam. Naturw., Berlin, LI, p. 201. [Massachusetts.]

1910. *Parydra imitans* Johnson in Smith's Ins. N. Jersey, (3), p. 807. [New Jersey.]

1925. *Napaea imitans* Johnson, Occ. Pap. Boston Soc. Nat. Hist., VII, p. 274. [Maine.]

1928. *Parydra imitans* Leonard, Mem. Cornell Univ., no. 101, p. 859. [New York.]

A scarce species in collections, known to me by forty specimens from Maine, Connecticut, Massachusetts, New York, New Jersey, and Georgia.

The species is very similar to *unituberculata,* but the tibiae are for the most part pale. The face with two strong facials; scutel-

[6] Present designation, selected by me in 1920.

lum more robust than in the above species, with the apical unarmed tubercle more conical, not nodose at tip.

The type [7] specimen, a male in the Loew Collection (M. C. Z., No. 11169), is in good condition.

Breviceps Group

In this group the species have the second vein of the wings appreciably shorter than in the Bituberculata Group; with the second costal section at most scarcely one and one-half times as long as the third; the antennal foveae weak to almost obsolete; the scutellar tubercles minute to absent and no indication of the lateral ones.[8] The macrochaetae are noticeably more strongly developed than in most of the species of the Bituberculata Group. Several of the species show facial characteristics of *bituberculata,* and others have a minute point at the apex of the scutellum, suggesting a tubercle.

The North American species are *breviceps, pinguis, vicina* and *transversa.*

Parydra breviceps Loew

1862. *Parydra breviceps* Loew, Monogr. Dipt. No. Amer., I, p. 167. [Middle States.]
1878. *Parydra limpidipennis* Loew, Zeits. f. Gesam. Naturw., Berlin, LI, p. 201. [District of Columbia.]
1890. *Parydra breviceps* Smith, Cat. Ins. N. Jersey, (1), p. 401. [New Jersey.]
1910. *Parydra breviceps* Johnson in Smith's Ins. N. Jersey, (3), p. 807. [New Jersey.]
1928. *Parydra breviceps* Leonard, Mem. Cornell Univ., no. 101, p. 859. [New York.]

A common species and known to me by 390 specimens from all states east of 104 degrees West Longitude, except Maine, Vermont, Rhode Island, Minnesota, North Dakota, Kentucky, Nebraska, Tennessee, North and South Carolina, Alabama, Louisiana and Arkansas; nor have I seen it from Canada. Cole's record of *limpidipennis* from Oregon [9] probably refers to *vicina* Cresson.

[7] My selection in 1920, first recorded here.
[8] The lateral scutellar tubercles are those just basad of the apicals.
[9] Proc. Cal. Acad. Sci., (4), XI, p. 335, 1921.

The species is distinguished from its relatives, in the Breviceps group, in having the bristle-bearing scutellar tubercles minute but usually discernible; face yellowish pollinose; abdomen with whitish transverse pollinose bands.

This species was described originally from the female sex, and there is one specimen in good condition in the Loew Collection, M. C. Z., No. 11174.[10] *Parydra limpidipennis* is a form with the wing maculation recessive and the crossveins narrowly clouded. It was originally described from the male sex, and the type, in the Loew Collection, M. C. Z., No. 11170,[10] is in good condition; and with it another male with the same data (Middle States).

Parydra pinguis Loew

1856. *Ephydra pinguis* Walker, Ins. Saund., IV, p. 409. [United States.]
1878. *Parydra pinguis* Loew, Zeits. f. Gesam. Naturw., Berlin, LI, p. 199. [Redescription, based on material from the District of Columbia and Texas.]
1900. *Parydra pinguis* Johnson in Smith's Ins. N. Jersey, (2), p. 693. [New Jersey.]

A species known to me by nine specimens from Pennsylvania, Ohio, Maryland, West Virginia, Kansas and Mississippi. It is unknown to me from Texas. Cole's record from Oregon [11] probably should refer to *papulata* Cresson.

A rare species, in the *breviceps* assemblage, recognized by the niveous face, which is slightly more prominent at the epistoma; the more elongate scutellum, which is more acute apicad, with rather distinct tubercles at bases of the apical bristles. The crossveins are more distinctly clouded, with accompanying whitish areas.

My recognition of this species is based on Loew's redescription and several characters noted in Walker's description, which are not combined in any other American species of the genus, but caution should be taken not to confuse this species with the rather aberrant *transversa* Cresson.

Parydra vicina Cresson

1940. *Parydra vicina* Cresson, Notulae Nat., Phila., no. 38, p. 9. [California.]

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[10] My selection in 1920, here first recorded.
[11] Proc. Calif. Acad. Sci., (4), 11: 335. 1921.

A rare form known to me by eighteen individuals from California and Oregon. It is very similar to, and may perhaps be a subspecies of, the eastern *breviceps*.

It averages slightly larger than *breviceps,* and the vestiture is more dense; the head in profile is not noticeably longer than high; frons less transverse; the interantennal hump or tubercle more pronounced in profile, and the legs slightly stouter.

Parydra transversa Cresson

1940. *Parydra transversa* Cresson, Notulae Nat., Phila., no. 38, p. 10. [Florida.]

A rare species known to me by twelve individuals from Florida. A species easily recognized by the maculate wings, elongate, convex scutellum with its two apical bristle-bearing tubercles, but without any suggestion of an unarmed apical tubercle. The broad, short face niveous, often showing some translucent ground color. In the development of the scutellar apex and its bristle-bearing apical tubercles the species simulates *imitans*.

Bituberculata Group

In this group we have the maximum development of the bristle-bearing scutellar tubercles, but no suggestion of an apical, unarmed tubercle on the scutellum; the second vein of the wings is long, apportioning the second and third costal sections about as 2 is to 1. The development of the macrochaetae is variable; in some species these bristles are scarcely discernible on the frons and mesonotum; the ventral surfaces are usually clothed with pale pile which is quite long.

North American species are *bituberculata, nitida, papulata, alpina, incommoda, tibialis* and *quadrituberculata.*

Parydra bituberculata Loew

1862. *Parydra bituberculata* Loew, Monogr. Dipt. No. Amer., 1, p. 165. ["Middle States."]

1890. *Parydra bituberculata* Smith, Cat. Ins. N. Jersey, (1), p. 401. [New Jersey.]

1900. *Parydra bituberculata* Johnson in Smith's Ins. N. Jersey, (2), p. 693. [New Jersey.]

1910. *Parydra bituberculata* Johnson in Smith's Ins. N. Jersey, (3), p. 807. [New Jersey.]

1928. *Parydra bituberculata* Leonard, Mem. Cornell Univ., no. 101, p. 859. [New York.]

A common eastern species, known to me by over 500 specimens from all states east of the Montana-New Mexico line except Rhode Island, North Dakota, Delaware, Kentucky, Nebraska, Tennessee, North and South Carolina, and the Gulf States (except Florida), Arkansas and Oklahoma. Tucker's record from Colorado [12] and Cole's record from Oregon [13] probably refer to *nitida* Cresson and/or *incommoda* Cresson.

The type of this species is a male labelled "Middle States" in the Loew Collection, in good condition (M. C. Z., No. 11168); [14] also in the same collection there are two males and three females, paratopotypes.

Parydra nitida Cresson

1915. *Parydra nitida* Cresson, Entom. News, xxvi, p. 70. [Idaho.]

This species is known to me by over 525 specimens from the Pacific and Rocky Mountain States west of the North Dakota-Texas line excluding New Mexico, Arizona and Southern California, but including Alaska, western Canada and Michigan. It will probably be found in other North Central States.

This appears to be the common western species of the *bituberculata* assemblage. It is distinguished from the eastern *bituberculata* by its more shining appearance occasioned by the less dense and more irregular distribution of the pollinose vestiture, the denuded areas reflecting blue rather than bronze, particularly on the face. The scutellum is broadly rounded distally, more convex dorsally, its tubercles small and globose. The median part of the metanotum is typically bare and shining, the vestiture sharply limited laterally, but often it covers all but the extreme middle.

From its western associate, *incommoda,* the separation in many instances is not marked, but see my remarks under that species. From the more northern, especially the Canadian, individuals of its eastern associate, *bituberculata,* it is very difficult to separate. Such material gives rise to the improbability that the present is a distinct species.

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[12] Kans. Univ. Sci. Bull., iv, p. 105, 1907.
[13] Proc. Cal. Acad. Sci., (4), xi, p. 334, fig. 49, 1921.
[14] Present designation, although selected in 1920 on my visit to Cambridge.

Parydra papulata new species

This species is similar to *nitida* Cresson in most respects, differing in its shining metallic blue color of the face medianly, which color becomes obscured ventrad by the cinereous to niveous vestiture, and contrasts noticeably with the more bronze color of the frons, parafacies and cheeks. In general slightly more shining than *nitida,* but the mesonotum is entirely dusted, not showing the denuded acrostichal lines.

The scutellar apicals closer together than in *nitida,* and generally parallel, not abruptly converging as is general with *nitida.* Size, 4.09–4.50 mm., excluding the wing; 5.89–7.19 mm., including the wing.

Type.—Male; Friday Harbor, Washington; (J. M. Aldrich); [Academy of Natural Sciences of Philadelphia, No. 6631].

Paratypes.—1 ♂, 3 ♀; topotypical; July 6, 1905 and July 23, 1908; (J. M. Aldrich).

In addition to the above, I have seen thirty-three specimens from Vancouver Island, Washington, Oregon and Idaho.

Parydra alpina new combination

1924. *Napaea alpina* Cresson, Entom. News, xxxv, p. 163. [Washington.]

A Boreal species, known to me by thirty-five individuals from Maine, Yellowstone National Park, Oregon, Washington; Ontario and British Columbia.

Distinguished from *papulata* by the less brilliant blue color of the face, clouded crossveins, broader frons and the more obliquely straight frons-facial profile. It is further recognized by the narrow head, and particularly by the long, fine, nearly cruciate facials. The face is also cinereous to niveous as in *papulata.*

Parydra incommoda Cresson

1930. *Parydra incommoda* Cresson, Entom. News, xli, p. 81. [Idaho.]

This species is known to me from western Canada, Montana, Wyoming, Colorado, Utah, Nevada, Idaho, Washington, California. It should also occur in Oregon, and it is probable that Cole's record of *quadrituberculata* from Oregon [15] applies to this species. The species seems to be less common than *nitida,* and I have examined over 125 specimens, finding very little variation. Occasionally the color of the vestiture is ochraceous rather than dark golden brown.

[15] Proc. Cal. Acad. Sci., (4), xi, p. 335, 1921.

Another western member of the *bituberculata* assemblage, occurring with, and of the general appearance of, *nitida,* from which it has only a few characters of differentiation. In my early studies of *bituberculata, nitida* and *incommoda,* I was rather doubtful of the validity of the present species, particularly as regards material from Colorado, the North Central states, and western and central Canada where *nitida* occurs. At that time, not having the opportunity of studying the three forms exhaustively, I concluded *incommoda* to be synonymous with *nitida,* and have determined some material accordingly, which has since been returned to the owners. I now find that *incommoda* does possess certain morphological features particularly in the male which seem to hold. These features I will here note; they will serve to distinguish the species without resorting to a detailed description.

As distinguished from *nitida, incommoda* has the frons more deeply sculptured, particularly the preocellar depression or sulcus; the scutellar tubercles are much longer and more approximate, the lateral ones often quite well developed (a very distinctive feature), and the metanotum, in good specimens, is entirely opaque, pruinose. Furthermore we find a definitely stronger development of the bristles and setae of the legs, of which, in the males there is a dense postflexor ciliation on the mid femur, and the flexor surface of the mid tibia is definitely more densely clothed, scopa-like, with black, curved setulae, which also extend onto the anterior surface as a series of long, curved setulae. The female I can distinguish only by the scutellar tubercles and the more dense condition of the setulae on the fore femur.

Parydra tibialis Cresson

1916. *Parydra tibialis* Cresson, Entom. News, xxvii, p. 150. [Arizona.]

This species is known to me by over one hundred individuals from Arizona, Colorado, New Mexico, Utah, Idaho, Washington, Oregon, California, Nebraska and South Dakota; also by a specimen from Pennsylvania. The individuals from South Dakota and Nebraska, and particularly Pennsylvania, although extra limital in distribution, show all the characters of the more western series.

A species rather conspicuously white pollinose and pilose, particularly the legs. The tibiae for the most part are generally pale, but sometimes entirely

black. The pile of the ventral surfaces and of the femora is long and altogether pale (white). The scutellum has the broad outline of *nitida* Cresson with its two to four small globose tubercles, the apical pair well separated; the abdomen noticeably aeneous; in fact the entire insect presents a more metallic reflection surface than do the other allied species.

Considerable variation is exhibited in the color of the tibiae, the individuals from Idaho and Washington being generally broadly black medianly.

Parydra quadrituberculata Loew

1862. *Parydra quadrituberculata* Loew, Monogr. Dipt. No. Amer., I, p. 165. ["Middle States."]
1890. *Parydra quadrituberculata* Smith, Cat. Ins. N. Jersey, (1), p. 401. [New Jersey.]
1895. *Parydra quadrituberculata* Johnson, Proc. Acad. Nat. Sci. Phila., 1895, p. 338. [Florida.]
1910. *Parydra quadrituberculata* Johnson in Smith's Ins. N. Jersey, (3), p. 807. [New Jersey.]
1925. *Parydra quadrituberculata* Johnson, Occ. Pap. Boston Soc. Nat. Hist., VII, p. 274. [Maine, Massachusetts.]
1928. *Parydra quadrituberculata* Leonard, Mem. Cornell Univ., no. 101, p. 859. [New York.]

A common species, confined, as far as known to me, to the portion of North America east of the Montana-New Mexico line from the states on the Gulf of Mexico north to southern Canada. Cole's record from Oregon[16] probably refers to *incommoda* Cresson.

I have seen material from all the states within the above area of distribution except Maine, Vermont, Connecticut, Rhode Island, West Virginia, Kentucky, Iowa, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Arkansas, and Oklahoma. It may not occur in the South Atlantic states, and Johnson's 1895 record may be a misidentification but I cannot understand Johnson mistaking this species.

The outstanding feature of this species is the pair of closely set, generally bristle-bearing scutellar tubercles, which are often contiguous and rarely separated by more than their length. The face is niveous to cinereous, very rarely tinged with ochraceous or brown.

There is very little variation within the species except in the development of the scutellar tubercles and in the extent of the pale

[16] Proc. Cal. Acad. Sci., (4), XI, p. 335, 1921.

color of the tibiae, these latter in the males, as a rule, being darker than in the females, sometimes entirely black. Rarely are the scutellar tubercles widely separated, thus simulating the western *incommoda* Cresson in this respect, but the facial vestiture in that species is brown.

Three males before me from Newton Hills and Dell Rapids, South Dakota, have the apical scutellar tubercles reduced to minute papillae, without bristles.

The type of this species is a female labelled "Middle States" in the Loew Collection, in good condition (M. C. Z., No. 11172);[17] also in the same collection are four paratopotype females.

Tribe GASTROPSINI new tribe

On the peculiar structure of the face, and the pectinate arista, I am considering the following genus, and including the Neotropical *Beckeriella* Williston, as constituting a distinct tribe.

Head strongly trigonal in cephalic aspect; eyes very prominent, almost semiglobose; arista with long hairs. Thorax rather globose; anterior notopleural usually present but weak. Abdomen subglobose, the lateral margins revolute, not sharp (thus simulating *Lytogaster,* but tergite IV not longer than III).

GASTROPS

1897. *Gastrops* Williston, Kans. Univ. Quart., VI, p. 3.
1912. *Ventrops* Grossbeck, Bull. Amer. Mus. Nat. Hist., XXXI, p. 378.[18]

The species of the genus *Gastrops* are recognized, among the Napaeinae, by the subconical or subhemispherical gibbosity on the upper part of the face, the lower part of the face, including the cheeks, decending like an apron around the mouth.

Key to the Nearctic Species of the Genus Gastrops

Wings immaculate; vein II without appendage.....**niger** Williston
Wings with many fuscous spots; vein II with appendage near its tip.....**nebulosus** Coquillett

[17] Present designation, although selected in 1920 on my visit to Cambridge.
[18] The name *Ventrops* is credited to Grossbeck, who introduced it in the literature when publishing his list of types in the Bulletin of the American Museum of Natural History, where he validated an apparent manuscript name by stating under *Gastrops niger* Williston, "The generic name *Ventrops* is written on the type label." *Gastrops niger* is the genotype of *Ventrops* by monotypy.

Gastrops niger Williston

1897. *Gastrops niger* Williston, Kans. Univ. Quart., VI, p. 3. [Brazil.]
1912. *Gastrops niger* Grossbeck, Bull. Amer. Mus. Nat. Hist., XXXI, p. 378. In list.

TEXAS: Brownsville, I 18, (T. C. Barber) and (J. C. Bridwell), [USNM, 2]. South Texas Gardens, Brownsville, XI 29, [INHS, 3]. Devil's River, V 5, (Bishopp), [USNM, 2].

Chiefly a Neotropical species, known to me within the United States by the above listed material from southern Texas.

The cheeks are broad but not more than one-half that of the eye-height in width, and the arista has eight to ten hairs.

Gastrops nebulosus Coquillett

1900. *Gastrops nebulosus* Coquillett, Can. Entom., XXXII, p. 34. [North Carolina and Georgia.]

An eastern species, known to me by thirty-two specimens from Connecticut, New Jersey, Michigan, Virginia, North Carolina, South Carolina, Georgia and Florida.

The present species is recognized by the maculate wings; otherwise structurally similar to *niger* Williston, but the setation is more recessive; the cheeks at least one-half the eye-height; third antennal segment but slightly longer than broad, the arista with six to eight hairs; mesonotum showing two, faint, whitish stripes; second vein generally rounding into the costa with its appendage generally at its tip, or at least beyond the bend; wing spots seldom occupying full width of the cells. Length, 3–3.5 mm.

The species was originally described from North Carolina and Tifton, Georgia. The type is a female from North Carolina, in the United States National Museum Collection, No. 4296 (present selection). The original description states that there were nine specimens in the G. de Hough collection, which is now in the University of Chicago; I have not seen them.

[Tribe HYADININI new tribe?

No statement of the tribal position of the genera *Hyadina, Lytogaster, Axysta* and *Pelina* has been found in the author's typed papers. In his long-hand MS. on the genus *Pelina* a phrase occurs which he omitted when typing it: after the words "differing from," page 257 below, it reads "the others of the tribe Hyadinini." These four genera are not included in his statement of the contents of the tribe Napaeini as given above. They can not be placed in

his new tribe Gastropsini, page 250 above, since they do not possess the strongly trigonal head, the long-haired arista and the subglobose abdomen which he assigned to that tribe. On the other hand, he has left us no statement of the tribal characters of the Hyadinini.]

HYADINA

1839. *Hyadina* Haliday, An. Nat. Hist., III, p. 406.
1910. *Hydrina* Coquillett (not Robineau-Desvoidy), Proc. U. S. Nat. Mus., XXXVII, p. 553.

A genus of small (1.5 to 2 mm. long) flies with reduced chaetotaxy: the only dorsal mesonotal bristles being the posterior intra-alars (sometimes erroneously called the prescutellars); antennae rather porrect, the superior margin of third segment dark, the inferior part pale; face with weak carina and median tuberosity, but with strongly flaring orbits; one (posterior) notopleural; wings immaculate or crossveins clouded, but sometimes with discal whitish areas; the abdomen with the lateral lobes of the tergites more or less sharply turned under, and the fourth tergite never longer than the fifth.

The species of this genus are easily confused with those of *Hydrina* and *Nostima,* but the face in those genera is narrower with its conical prominence lower, and they have one or more dorsocentrals. From *Lytogaster* it is more difficult to separate, and one has to depend on the comparative lengths of the third and fourth tergites and the degree and method of their lateral extensions. From *Axysta* and *Pelina, Hyadina* may be more easily separated by the structure of the face and abdomen.

Hyadina was originally proposed as a subgenus of *Ephydra,* to include *Notiphila guttata* Fallen and *H. scutellata* new species. Of these two species, *guttata* was practically selected as the genotype by Westwood in 1840, (Synop. Gen. Brit. Ins., p. 153). Coquillett (1910) selected the same species as the genotype of *Hydrina* Robineau-Desvoidy, 1830, a member of another subfamily (Notiphilinae), but *N. guttata* was not, by that name, an included species of *Hydrina.* Coquillett, however, overcame this by considering Fallen's species synonymous with *Hydrina vernalis* Robineau-Desvoidy, an included species; thus synonymizing *Hydrina* and *Hyadina.* In my treatment of the genus *Hydrina* (Trans. Amer. Ent. Soc., LVI, p. 93, 1930.), I considered Coquillett was in error, as the descriptions of the two species do not agree.

But Coquillett's treatment was followed by most students since 1910 and created some confusion in the names of the two genera, *i.e.: Hydrina* was used instead of *Hyadina* Haliday, and *Philygria* Stenhammar instead of *Hydrina* Robineau-Desvoidy.

Hyadina albovenosa Coquillett

1900. *Hyadina albovenosa* Coquillett, Can. Entom., XXXII, p. 34. [Georgia, Louisiana.]

1907. *Hyadina albovenosa* Tucker, Sci. Bull. Kans. Univ., IV, p. 105. [Kansas.]

A scarce species of the Central, Eastern, and Southeastern states, and of which I have seen fifty-eight specimens from Connecticut, New York, Pennsylvania, Michigan, Minnesota, Maryland, Virginia, Indiana, Illinois, Kansas, Tennessee, South Carolina, Georgia, Alabama, Mississippi, Louisiana, Texas, and Canada (Manitoba).

A small (1 to 1.5 mm.) shining species, easily recognized by the immaculate wings with both crossveins conspicuously niveous. There are at most only small inconspicuous, opaque black, lateral basal spots on the scutellum.[19]

This species was originally described from three females from Tifton, Georgia and Opelousas, Louisiana. The type is a female from Tifton, (U. S. Nat. Mus. Coll., No. 4295) by present selection.

Hyadina binotata (Cresson) new combination

1926. *Hydrina binotata* Cresson, Trans. Amer. Ent. Soc., LII, p. 256. [California.]

1930. *Hyadina macquarti* Cresson, Entom. News, XLI, p. 80. [Alaska.] New synonymy.

A species of wide distribution. It is known to me by 23 individuals from Alaska, British Columbia, Alberta, Manitoba; New York, New Jersey, Pennsylvania, Michigan, Minnesota, Virginia, Maryland, Ohio, Indiana, Illinois, Tennessee, Georgia, Colorado, New Mexico, Arizona, Utah, Washington, Oregon and California.

A shining black species with sparse brown and gray dorsal pollinose vestiture, but the sides of the scutellum are conspicuously opaque black. It is quite variable, however, in many respects. The wings are with, or without, the large whitish discal areas around the posterior crossvein; legs

[19] *Nostima niveivenosa* Cresson, from Puerto Rico, has similarly niveous crossveins, but the different facial structure and the presence of dorsocentrals will distinguish that species.

may be entirely yellow, or the femora almost entirely black; the mesonotal gray stripes distinct anteriorly or entirely absent. Also there is some variation in the color of the facial vestiture (white or yellow). The darker forms with reduced whitish areas in the wings, occur more northward, and an Alaskan form has been described as *macquarti* which does not seem to be deserving nominal recognition. The typical form has the whitish areas large and distinct as are also the gray mesonotal vittae.

The abdomen in the male sex generally assumes an arched form, similar to the species of *Lytogaster,* due to the elongation of the fourth and fifth tergites (not of the fourth alone), consequently one should use care in this respect, when separating the species of the two genera.

Hyadina corona (Cresson) new combination

1926. *Hydrina corona* Cresson, Trans. Amer. Ent. Soc., LII, p. 256. [Pennsylvania.]

This species is known to me by five specimens from New York, Michigan and Pennsylvania.

A brown and gray semiopaque species, easily recognized by the appendage to the second vein near its tip, and the lateral, velvety black margins of the scutellum. The legs are, for the most part, black; the wings have two large whitish areas almost enclosing the dark crossveins.

Hyadina pruinosa (Cresson) new combination

1926. *Hydrina pruinosa* Cresson, Trans. Amer. Ent. Soc., LII, p. 256. [California.]

A western species known to me by nineteen specimens from Alberta (Canada), South Dakota, Utah, Idaho, Washington, Oregon, and California.

This species has rather dense brownish pollinose vestiture on the frons and mesonotum, almost obliterating the shining surfaces; the mesonotum with distinct gray spots and stripes. The third antennal segment is rather disciform, not longer than broad; scutellum not opaque black laterally; legs entirely yellow. Wings with dark crossveins and faint discal whitish areas; antepenult section of the fourth vein distinctly longer than the posterior crossvein (about twice as long); second vein without appendage.

LYTOGASTER

1896. *Lytogaster* Becker, Berl. Ent. Zeits., XLI, (2), p. 202.

The species of this genus generally, in well preserved material, are readily distinguished by the unusually convex, subhemispherical shape of the abdomen, due to the shortening of the second and

third tergites and the lengthening of the fourth; also in the revolute lateral lobes of the tergites which do not sharply reflect against the venter. Otherwise, the species are not materially different, but a few are difficult to distinguish from several of the genus *Hyadina*.

Key to the Nearctic Species of the Genus Lytogaster

1. Frons, mesonotum and scutellum rugulose and granulose; third antennal segment disciform.....**gravida** (Loew)
   Frons and mesonotum smooth.....2
2. Verticals and ocellars minute; third antennal segment disciform and entirely black.....**abdominalis** (Stenhammar)
   Verticals and ocellars well developed.....3
3. Fore femur and tibia, sometimes all legs, entirely pale; scutellum flattened, scabrous; costa III distinctly longer than II..**furva** Cresson
   Fore femur and tibia black; scutellum convex, smooth; costa III scarcely longer than II.....**extera** Cresson

Lytogaster furva Cresson

1926. *Lytogaster furva* Cresson, Trans. Amer. Ent. Soc., LII, p. 257. [New York.]

A rare species, known to me by nine individuals from New York, New Jersey, Maryland, Georgia, Florida, Texas, Arkansas, Illinois, and Indiana.[20]

A shining species with flat, quadrate scabrous scutellum. The inferior half of the third section of the antennae, the fore legs always, and generally (but not typically) the mid and hind legs, pale. The third section of the costa always, sometimes very much, longer than the second. The vertical bristles and ocellars are well developed.[21]

Lytogaster extera Cresson

1924. *Lytogaster extera* Cresson, Entom. News, XXXV, p. 162. [New Jersey.]
1926. *Lytogaster extera* Cresson, Trans. Amer. Ent. Soc., LII, p. 257. [New Jersey.]

This is a northern species, known to me by five individuals from Massachusetts, New Jersey, Minnesota, Illinois, and eastern Canada.

[20] A form, possibly a distinct species, occurs on the Bermuda Islands of which I have seen insufficient material and in too poor condition for proper analysis.

[21] The Neotropical *pallipes* Cresson, is similar but the scutellum is smooth and convex; and the second section of the costa is as long as the third.

It is totally black except the tarsi, which are unusually brownish. The verticals and ocellars are well developed; the frons and mesonotum are smooth; the convex scutellum and abdomen medianly, somewhat roughened; the third segment of the antennae disciform and entirely black.

This species was inadvertently described twice under the same name, as is indicated in the above bibliographical references.

Lytogaster abdominalis (Stenhammar)

1844. *Philygria abdominalis* Stenhammar, K. Svenska Vet.-Akad., Handl., 1843, p. 238. [Sweden.]

1896. *Lytogaster abdominalis* Becker, Berl. Ent. Zeits., XLI, (2), p. 203, pl. 5, fig. 9; pl. 7, fig. 16.

This appears to be the Boreal species, originally described from Europe. It is known to me in America by three individuals from Canada, New York, and South Dakota.

A shining black species with inconspicuous ocellar and vertical bristles. The antennae and femora and tibiae are also black.

Lytogaster gravida (Loew) new combination

1863. *Hyadina gravida* Loew, Berl. Ent. Zeits., VII, p. 325. (Cent. 4, no. 98.) [Sitka, Alaska.]

1916. *Lytogaster willistoni* Cresson, Entom. News, XXVII, p. 150. [California.]

A common species known to me by 350 specimens from Alaska, Canada, and all states except the following where it probably occurs: Vermont, New Hampshire, Rhode Island, Connecticut, Wisconsin, North Dakota, Delaware, West Virginia, Kentucky, Missouri, Iowa, Nebraska, North and South Carolina, Georgia, Alabama, Louisiana, Arkansas and Texas.

This species is recognized by the rough dorsal surfaces of the head, thorax and abdomen; and the great dorsal elongation of the fourth tergite.

The species was described from the male sex. I could not find the type in the Loew Collection at Cambridge. The synonymy of *willistoni* was called to my attention years ago by the late Dr. Aldrich, and since then all my determinations were made under *gravida,* but the synonymy has not heretofore been published. I have found this species in many collections under the name *Pelina brevis* Walker.

AXYSTA

1839. *Axysta* Haliday, An. Nat. Hist., III, p. 406.

The species of this genus differ from others of the tribe in having the costa of the wings not extending beyond the tip of the fourth vein. Otherwise they are similar to those of *Lytogaster,* except that the lateral lobes of the tergites are sharply reflexed against the venter. In surface structure they resemble the members of the genus *Gastrops* except that the face is not definitely gibbous.

Axysta bradleyi Cresson

1930. *Axysta bradleyi* Cresson, Entom. News, XLI, p. 79. [Georgia and Illinois.]

This species is known to me by five individuals from Virginia, Georgia, Illinois and Oklahoma.

The species has the inferior part of the third antennal segment pale, the arista white and pubescent. The frontorbitals are wanting; the second section of the costa shorter than the third; penultimate section of the fourth vein, at most, twice as long as the posterior crossvein.

Axysta cesta (Haliday)

1833. *Ephydra cesta* Haliday, Entom. Mag., I, p. 177. [Ireland.]
1860. *Axysta cesta* Loew, Neue Beitr., VII, p. 28.

This species, originally described as European is known to me also by three individuals from Alaska and Washington.

It is distinguished from *bradleyi* by the entirely black arista and antennae. The frontorbitals are strong and latroclinate; the second section of the costa equals or is longer than the third; penultimate section of the fourth vein about three times as long as the posterior crossvein.

PELINA

1839. *Pelina* Haliday, An. Nat. Hist., III, p. 407.
1934. *Pelina* Cresson, Trans. Amer. Ent. Soc., LX, p. 209.

A Holarctic genus, differing from the others of the tribe, in its flat or carinate, not medianly prominent, face; flattened abdomen with sharp lateral margins, and the wings with long second vein. The arista is bare or pubescent, and there are two strong notopleurals. It may prove to belong to a distinct tribe.

Key to the Nearctic Species of the Genus Pelina

1. Face and head very broad, the former as broad as long, the latter nearly twice as broad as high....3
   Face longer than broad; the head not twice as broad as high....2
2. Mesopleura shining, granulose, antero-ventrally somewhat rugulose. **rudis** Cresson
   Mesopleura pollinose....**compar** Cresson
   Mesonotum smooth and polished....**aenescens** (Stenhammar)
3. Abdomen irregularly, longitudinally rugulose....**truncatula** Loew
   Abdomen sparingly micro-punctate, the rugulae, if present, transverse....**canadensis** Cresson

Pelina truncatula Loew

1878. *Pelina truncatula* Loew, Zeits. f. Gesam. Naturw., Berlin, LI, p. 198. [Texas.]

A common species of the Western States, but also occurring eastward. It is known to me by 450 individuals from Canada, all states west of the Montana-New Mexico line; also from Massachusetts, New York, New Jersey, Michigan, Minnesota, South Dakota, Ohio, Indiana, Illinois and Texas. I have not seen any from southeast of the Mississippi and Ohio Rivers.

A shining species very similar to the European *Pelina aenea* (Fallen), with the mesonotum and scutellum more or less rugulose, the frons less so, and the abdomen rather granulose and with close, wavy or ziz-zag, longitudinal rugulae, but which show much variation in distinctness, sometimes very weak and may be entirely wanting towards the margins of the abdomen, in which case the surface is smooth and highly polished. The mesonotum shows two to four, grayish, granulose stripes separating three, somewhat metallic, smoother stripes. The face is much broader than long. The scutellar apex is truncate, often concaved and the apical bristles have minute basal tubercles. The penultimate section of the third vein is about twice as long as the posterior crossvein.

The type appears to be a male in good condition in the Loew collection (M. C. Z., No. 11165). There is also, in the same collection, another specimen of the same sex, also from Texas.

Pelina canadensis Cresson

1934. *Pelina canadensis* Cresson, Trans. Amer. Ent. Soc., LX, p. 208. [Manitoba, British Columbia, Minnesota.]

A Boreal species, known to me by the type series of four specimens.

Very similar to *truncatula,* and difficult to distinguish. The salient features are the more shining appearance (due to the weaker sculpturing) and the different abdominal surface, in which the rugulae are mostly limited to the second tergite, and are transverse, not longitudinal. The dorsum of the other tergites is scabrous rather than rugulose, becoming obsolete laterally.

Pelina rudis Cresson

1940. *Pelina rudis* Cresson, Notulae Nat., Phila., no. 38, p. 9. [Michigan.]

This species is known to me by three specimens from Michigan and Connecticut.

A slender, shining, granulose species with the antero-ventral part of the mesopleura somewhat rugulose. It differs from *truncatula* in the narrower head, which, in comparison to the height, is as 28 to 18. The surfaces are also more sculptured than in either *aenescens* or *compar.*

Pelina aenescens (Stenhammar)

1844. *Telmatobia aenescens* Stenhammar, K. Svenska Vet.-Akad., Handl., 1843, p. 210. [Sweden.]

1856. *Pelina aenescens* Haliday in Walker, Ins. Brit. Dipt., III, p. 345.

This species has not heretofore been reported from North America. I have seen six individuals from Churchill, (Manitoba), Canada, VIII 2–9, (D. G. Dunning), [Univ. Minn.].

A slender, shining, entirely black species, with bare, polished mesopleura. The mesonotum is smooth and the scutellum weakly coriaceous. The abdomen is finely granulose on second and third tergites. The face is scarcely broader than long.

Pelina compar Cresson

1934. *Pelina compar* Cresson, Trans. Amer. Ent. Soc., LX, p. 207. [Washington.]

A Boreal species, of which I have seen thirteen individuals from Manitoba, Colorado, Wyoming, Idaho, Washington, and Oregon.

A slender, shining, species with smooth mesonotum, granulose scutellum and abdomen; the mesopleura is somewhat micro-rugulose or granulose, on the antero-ventral part, thus differing from *aenescens.*

Additions and Corrections

The following are a few omissions from previous parts of this series.[22]

Psilopinae

Allotrichoma simplex (Loew) page 108, (1942)

1926. *Allotrichoma lasiocercum* Cresson, Trans. Amer. Ent. Soc., LII, p. 251. [California.]

1926. *Allotrichoma lacteum* Cresson, Trans. Amer. Ent. Soc., LII, p. 252. [Arizona.]

These synonyms were overlooked, and are based on the study of additional material.

Discocerina (Discocerina) obscurella (Fallen) page 115 (1942), 160 (1944)

1916. *Discocerina parva* var. *nigriventris* Cresson, Entom. News, XXVII, p. 148. [California.]

Nigriventris is merely a darker form of *obscurella,* and should not be considered nominally.

Notiphilinae

In the key for *Nostima picta* page 177 (1944) read:

Frons not entirely velvety-black; legs generally darker..**picta** (Fallen)

Nostima picta (Fallen) page 176, (1944)

Include New York in the note on distribution.

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[22] These *Transactions,* LXVIII, pp. 101–128, (1942); LXX, pp. 159–180, (1944).

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